CAMBRIDGE

PHARMACOLOGY SHORT NOTES

Essential Guide for Doctors & Medical Students

1ST EDITION

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1 Analgesics

Paracetamol (Acetaminophen)

Mechanism of Action

Weak inhibitor of the synthesis of prostaglandins, Paracetamol also decreases prostaglandin concentrations in vivo,

Indications

- Mild to moderate pain
- Pyrexia

Cautions

- Before administering, check when paracetamol last administered and cumulative paracetamol dose over previous 24 hours
- Body-weight under 50 kg
- Chronic alcohol consumption, dehydration, malnutrition
- Hepatocellular insufficiency
- Long-term use (Especially in those who are malnourished)

Pregnancy

Not known to be harmful

Breast feeding

Amount too small to be harmful

Side effects

Common : With rectal use Anorectal erythema

Rare : Thrombocytopenia Hypersensitivity, Hypotension, Agranulocytosis, Bronchospasm, Hepatic function abnormal, severe cutaneous adverse reactions (SCARs)

Overdose : Liver damage and less frequently renal damage

Adult dose

Oral : 0.5–1 g every 4–6 hours ; maximum 4 g per day

Intravenous Infusion : 15 mg/kg every 4–6 hours, dose to be administered over 15 minutes; maximum 60 mg/kg per day

Pediatric dose

10-15 mg/kg/dose, give every 4-6 hours and do not exceed more than 5 doses (2.6 g) in 24 hours

Aspirin

Mechanism of Action

Aspirin causes reduction of inflammation, analgesia, the prevention of clotting and antipyretic, Much of this is believed to be due to decreased production of prostaglandins and thromboxane A2 by its irreversible inactivation of the cyclooxygenase (COX) enzyme, Cyclooxygenase is required for prostaglandin and thromboxane synthesis,

Indications

- Cardiovascular disease (secondary prevention)
- Unstable angina and non-st-segment elevation myocardial infarction (NSTEMI) & st-segment elevation myocardial infarction (STEMI)
- Transient ischaemic attack
- Acute ischaemic stroke
- Atrial fibrillation
- Following coronary by-pass surgery
- Mild to moderate pain
- Pyrexia

Contraindications

- Active peptic ulceration
- Bleeding disorders
- **Children under 16 years - risk of Reye's syndrome**
- Haemophilia
- Previous peptic ulceration
- Severe cardiac failure

Cautions

- Allergic disease, Anaemia, Asthma, Dehydration, Elderly & G6PD deficiency
- Thyrotoxicosis
- Uncontrolled hypertension

Side effects

Common : Dyspepsia & haemorrhage with oral use

Rare/ Very rare : Bronchospasm, Dyspnoea, rhinitis, severe cutaneous adverse reactions (SCARs), skin reactions, Aplastic anaemia, erythema nodosum, granulocytosis, vasculitis, intracranial haemorrhage , menorrhagia, thrombocytopenia

Overdose

- The main features of Aspirin/salicylate poisoning are hyperventilation, tinnitus, deafness, vasodilatation, and sweating.
- Coma is uncommon but indicates very severe poisoning.

Pregnancy

- Use antiplatelet doses with caution during Third trimester; risk of haemorrhage
- High doses may be related to intra-uterine growth restriction, teratogenic effects, closure of fetal ductus arteriosus in utero and risk of pulmonary hypertension of newborn

Breast feeding

Avoid—possible risk of Reye's syndrome

Adult Dose

Oral : 75mg – 300mg once daily, depend on the clinical condition.

Pediatric dose

Should not be given to children under 16 years, unless specifically indicated, e.g. for Kawasaki disease.

Diclofenac Sodium

Mechanism of Action

Diclofenac has analgesic, anti-inflammatory, and antipyretic properties. It causes inhibition of cyclooxygenase (COX-1 and COX-2) and act as a potent inhibitor of prostaglandin synthesis in vitro.

Indications

- Pain and inflammation in musculoskeletal disorders such as acute gout
- Rheumatic disease including juvenile idiopathic arthritis
- Postoperative pain
- Adjunctive treatment in knee or hand osteoarthritis
- Ureteric colic

Cautions

- With systemic use :
  - Cardiac impairment
  - Coagulation defects
  - Inflammatory bowel disease
  - Elderly

- With topical use :
  - Avoid contact with eyes
  - Avoid contact with inflamed or broken skin & mucous membranes

Contraindications

- With intravenous use :
  - Dehydration
  - History of asthma
  - History of confirmed or suspected cerebrovascular bleeding
  - History of haemorrhagic diathesis
  - Hypovolaemia
  - Operations with high risk of haemorrhage
- With systemic use :
  - History of gastro-intestinal bleeding, ulceration or perforation
  - Cerebrovascular & Ischaemic heart disease, Peripheral arterial disease
  - Mild to severe heart failure

Side effects

Common : With systemic use appetite decreased, diarrhoea, dizziness, gastrointestinal discomfort, gastrointestinal disorders, headache,

nausea, oedema, rash (discontinue), skin reactions, vertigo, Vomiting

Rare/ Very rare : With systemic use Acute kidney injury, chest pain, heart failure, myocardial infarction, palpitations & with topical use abdominal pain, alopecia, diarrhea, eye, pain, haemorrhage

Pregnancy

- Avoid unless the potential benefit outweighs the risk.
- Avoid during the third trimester (risk of closure of fetal ductus arteriosus in utero and possibly pulmonary hypertension of the newborn

Adult Dose

Oral, Rectal **:** 75–150 mg daily in 2–3 divided doses

Pediatric dose

Oral, Rectal : 1mg/kg per dose, 3 times per day & May vary depending on the clinical condition. (Refer BNF for Children)

Tramadol hydrochloride

Mechanism of Action

Tramadol acts on the mu opioid receptor, blocking the neuron from communicating pain to the brain.

Indications

- Moderate to severe acute & chronic pain
- Postoperative pain

Cautions

- Excessive bronchial secretions
- History of epilepsy—use tramadol only if compelling reasons
- Impaired consciousness
- Not suitable as a substitute in opioid-dependent patients
- Not suitable in some types of general anesthesia
- Postoperative use (in children)
- Susceptibility to seizures—use tramadol only if compelling reasons
- Variation in metabolism

Contraindications

- Acute intoxication with alcohol .
- acute intoxication with analgesics . acute intoxication with
- hypnotics . acute intoxication with opioids . compromised
- respiratory function (in children) . not suitable for narcotic
- withdrawal treatment . uncontrolled epilepsy

Side effects

Common : Fatigue

Rare : Dyspnea, epileptiform seizure . respiratory disorders . sleep disorders . vision blurred

Pregnancy

- Embryotoxic in animal studies - manufacturers advise **avoid**.

Breast feeding

- Amount probably too small to be harmful, but manufacturer advises **avoid**.

Adult Dose

Initially 50 mg, then, adjusted according to response; Usual maximum 400 mg/24 hours

Pediatric dose

Initially 50 mg, then, adjusted according to response; Usual maximum 400 mg/24 hours

Pethidine hydrochloride (Meperidine)

Mechanism of Action

Pethidine exerts its analgesic effects by acting as an agonist at the μ-opioid receptor

Indications

- Acute pain
- Obstetric analgesia
- Premedication
- Postoperative pain

Cautions

- Accumulation of metabolites may result in neurotoxicity
- Cardiac arrhythmias
- Not suitable for severe continuing pain
- Severe cor-pulmonale

Contraindications

- Phaeochromocytoma

Side effects

General : Biliary spasm . dysuria . Hypothermia

Specific : With oral use Agitation, mood altered, muscle rigidity, sexual dysfunction, ureteral spasm & with parenteral use anxiety, impaired coordination, delirium, seizure, syncope, tremor

Overdose : Convulsions reported in overdosage

Pregnancy

- Analgesic of choice in pregnancy, but should be used with caution as it may produce respiratory depression in fetus.

Breast feeding

- Present in milk but not known to be harmful.

Adult Dose

25-150 mg, depending on the clinical condition. (Refer BNF)

Morphine

Mechanism of Action

Morphine is an Opioid analgesic, activating opiate receptors that are widely distributed throughout the brain and body. Once an opiate reaches the brain, it quickly activates the opiate receptors that are found in many brain regions &produce pleasure (or reward) and pain relief. The brain itself also produces substances known as endorphins that activate the opiate receptors. Morphine mimics endogenous neurotransmitters (endorphins). Morphine binds to specific morphine-like (endorphin) receptors (EndR).

Indications

- Acute & chronic severe pain
- Pain management in palliative care
- Cough in palliative care
- Premedication
- Patient controlled analgesia (PCA)
- Myocardial infarction
- Acute pulmonary oedema
- Dyspnoea at rest in palliative care

Cautions

- Cardiac arrhythmias ,pancreatitis, severe cor pulmonale

Contraindications

- With intravenous use :
  - sdsd, Peripheral arterial disease
  - Mild to severe heart failure

Side effects

Common/very common : With oral use Appetite decreased, asthenic conditions, gastrointestinal discomfort, insomnia, neuromuscular dysfunction

Uncommon : With oral use Agitation, bronchospasm, ileus , mood , altered , myoclonus, peripheral oedema , pulmonary oedema , seizure ,sensation abnormal , syncope, taste altered

Pregnancy

- Contraindicated

Breast feeding

- Therapeutic doses unlikely to affect infant.

Adult Dose

Subcutaneous injection : For Pain

- **Adult :** Initially 10 mg every 4 hours, adjusted according to response
- **Elderly :** Initially 5 mg every 4 hours, adjusted according to response

Intravenous Infusion : For Pain

- **Adult :** Initially 5 mg every 4 hours, adjusted according to response

(Refer BNF)

Pediatric dose

Oral, Subcutaneous/Intramuscular injection : For Pain

- **Child 1–11 years:** Initially 100-200 µg/kg every 4 hours, adjusted according to response
- **Child 12–17 years:** Initially 2.5–10 mg every 4 hours, adjusted according to response

(Refer BNF for Children)

2 Antiarrythmatics

Adenosine

Mechanism of Action

Adenosine slows conduction time through the A-V node, can interrupt the reentry pathways through the A-V node, and can restore normal sinus rhythm in patients with arrythmias.

Indications

- Paroxysmal supraventricular tachycardias
- Wolff-Parkinson-White syndrome
- Used to aid to diagnosis of broad or narrow complex supraventricular tachycardias
- Used in conjunction with radionuclide myocardial perfusion imaging in patients who cannot exercise adequately or for whom exercise is inappropriate

Contraindications

- Asthma & Chronic obstructive lung disease
- Decompensated heart failure
- Long QT syndrome
- Second- or third-degree AV block and sick sinus syndrome (unless pacemaker fitted) .
- Severe hypotension

Cautions

- Atrial fibrillation & atrial flutter with accessory pathway
- Autonomic dysfunction
- Bundle branch block
- First-degree AV block
- Heart transplant
- Left main coronary artery stenosis
- Left to right shunt
- Pericardial effusion & pericarditis
- QT-interval prolongation
- Recent myocardial infarction
- Severe heart failure
- Stenotic carotid artery disease with cerebrovascular insufficiency
- Stenotic valvular heart disease
- Uncorrected hypovolaemia

Side effects

Common/very common : Abdominal discomfort, arrhythmias, atrioventricular block, chest discomfort, chest pain (discontinue), dizziness, dry mouth, dyspnea, flushing, headache, hypotension (discontinue if severe), pain, paraesthesia, throat discomfort

Uncommon : Asthenia, back discomfort, bradycardia (discontinue if asystole or severe bradycardia occur), hyperhidrosis, limb discomfort, nervousness, taste metallic

Pregnancy

Large doses may produce fetal toxicity; manufacturer advises use only if potential benefit outweighs risk.

Breast feeding

No information available—unlikely to be present in milk owing to short half-life.

Adult Dose

Intravenous Injection : 3mg- 6mg followed by 6mg-12 mg (Different doses according to clinical condition, refer BNF)

Amiodarone hydrochloride

Mechanism of Action

It's primarily a class III antiarrhythmic. Like other antiarrhythmic drugs of this class, amiodarone works primarily by blocking potassium rectifier currents that are responsible for the repolarization of the heart during phase 3 of the cardiac action potential.

Indications

- Paroxysmal supraventricular, nodal and ventricular tachycardias
- Atrial fibrillation and flutter
- Ventricular fibrillation
- Tachyarrhythmias associated with wolff-parkinson-white syndrome
- Pulseless ventricular tachycardia refractory to defibrillation

Contraindications

- **General contraindications :**
  - Avoid in severe conduction disturbances (unless pacemaker fitted)
  - Avoid in sinus node disease (unless pacemaker fitted)

- Iodine sensitivity
- Sino-atrial heart block (except in cardiac arrest)
- Sinus bradycardia (except in cardiac arrest)
- Thyroid dysfunction

- **Specific contraindications :** with intravenous use
  - Avoid bolus injection in cardiomyopathy
  - Avoid bolus injection in congestive heart failure
  - Avoid in circulatory collapse
  - Avoid in severe arterial hypotension
  - Avoid in severe respiratory failure

Cautions

- **General cautions :**
  - Acute porphyrias
  - Conduction disturbances (in excessive dosage)
  - Elderly
  - Heart failure .
  - Hypokalaemia
  - Severe bradycardia (in excessive dosage)

- **Specific cautions :** with intravenous use
  - Moderate and transient fall in blood pressure (circulatory collapse precipitated by rapid administration or overdosage)
  - Severe hepatocellular toxicity

Side effects

Common/ very common : arrhythmias, hepatic disorders, hyperthyroidism, nausea, respiratory disorders, skin reactions

With oral use - constipation, corneal deposits, hypothyroidism, movement disorders, photosensitivity reaction, sleep disorders, taste altered, vomiting

With parenteral use - hypotension

Rare or very rare : bronchospasm (in patients with severe respiratory failure), headache, idiopathic intracranial hypertension, nerve disorders, SIADH

With oral use – alopecia, aplastic anaemia, epididymoorchitis, erectile dysfunction, haemolytic anaemia, pulmonary haemorrhage, thrombocytopenia, vertigo

Pregnancy

Possible risk of neonatal goiter, use only if no alternative.

Breast feeding

Avoid; present in milk in significant amounts; theoretical risk of neonatal hypothyroidism from release of iodine.

Adult Dose

Oral : 200 mg 3 times a day for 1 week, then reduced to 200 mg twice daily for a further week, followed by maintenance dose, usually 200mg daily or the minimum dose required to control arrhythmia

Intravenous infusion :

- Initially 5 mg/kg, to be given over 20–120 minutes, subsequent infusions given if necessary according to response;
- Maximum 1.2 g per day

(Different doses according to clinical condition, refer BNF)

Digoxin

Mechanism of Action

Digoxin increases the force of contraction of the heart muscles by inhibiting the activity of an enzyme (ATPase) that controls movement of calcium, sodium, and potassium into heart muscle. Inhibiting ATPase increases calcium in heart muscle and therefore increases the force of heart contractions. Digoxin also slows electrical conduction between the atria and the ventricles of the heart and is useful in treating arrythmias.

Indications

- Rapid digitalisation, for atrial fibrillation or flutter
- Maintenance, for atrial fibrillation or flutter
- Heart failure (for patients in sinus rhythm)
- Emergency loading dose, for atrial fibrillation or flutter

Contraindications

- Constrictive pericarditis (unless to control atrial fibrillation or improve systolic dysfunction - but use with caution)
- Hypertrophic cardiomyopathy (unless concomitant atrial fibrillation and heart failure - but use with caution)
- Intermittent complete heart block
- Myocarditis
- Second degree AV block
- Supraventricular arrhythmias associated with accessory conducting pathways e.g. Wolff-parkinson-white syndrome (although can be used in infancy)
- Ventricular tachycardia or fibrillation

Cautions

- Risk of digitalis toxicity in
  - Hypercalcaemia, hypokalaemia, hypomagnesaemia, hypoxia
  - Recent myocardial infarction
  - Severe respiratory disease
  - Sick sinus syndrome
  - Thyroid disease

Side effects

Common/very common : arrhythmias, cardiac conduction disorder, cerebral impairment, diarrhea, dizziness, eosinophilia, nausea, skin reactions, vision disorders, vomiting
Rare/very rare : appetite decrease, asthenia, confusion, gastrointestinal disorders, gynecomastia, headache, depression

If toxicity occurs, digoxin should be withdrawn; serious manifestations require urgent specialist management.

Pregnancy

May need dosage adjustment.

Breast feeding

Amount too small to be harmful.

Adult Dose

62.5µg – 1.5mg, vary depends on the clinical condition. Refer BNF

Bisoprolol fumarate

Mechanism of Action

Bisoprolol is a synthetic beta1-selective beta-adrenergic receptor blocker with a low affinity for beta2-receptors in bronchial smooth muscle, blood vessels, and fat cells and no intrinsic sympathomimetic activity. Therefore Bisoprolol exerts cardio-selective effects include lower heart rate, decreased cardiac output, and inhibition of renin release by kidneys. At higher doses it will lose beta1 selectivity.

Indications

- Hypertension
- Angina
- Adjunct in heart failure

Contraindications

- Acute or decompensated heart failure requiring intravenous inotropes
- Sino–atrial block

Cautions

- Ensure heart failure not worsening before increasing dose

Side effects

Common / very common : Constipation
Rare or very rare : Allergic rhinitis, alopecia, Auditory disorder, conjunctivitis, flushing, hypersensitivity, Pruritus, Muscle cramps, muscle weakness, postural hypotension

Adult Dose

Oral : In Hypertension & Angina

- 5-10 mg once daily
- maximum 20 mg per day

Adjunct in heart failure

- Initially 1.25 mg once daily for 1 week
- maximum 10 mg per day

(Refer BNF)

Atenolol

Mechanism of Action

It’s a Cardioselective beta-1-adrenergic antagonist, works by selectively binding to the beta-1 adrenergic receptors found in vascular smooth muscle and the heart, blocking the positive inotropic and chronotropic actions of endogenous catecholamines, thereby inhibiting sympathetic stimulation. This activity results in a reduction in heart rate, blood pressure, and decreases myocardial contractility.

Indications

- Hypertension
- Angina
- Arrhythmias
- Migraine prophylaxis
- Early intervention within 12 hours of myocardial infarction

Side effects

Common/very common : Gastrointestinal disorder

Rare/ very rare : Alopecia . dry mouth . hepatic disorders, mood altered, postural hypotension, psychosis, skin Reactions, thrombocytopenia

Breast feeding

Water soluble beta-blockers such as atenolol are present in breast milk in greater amounts than other beta blockers.

Adult Dose

Oral : 25-100 mg, depends on the clinical condition (Refer BNF)

Diltiazem hydrochloride

Mechanism of Action

Diltiazem is a benzothiazepine derivative with anti-hypertensive, antiarrhythmic properties. It blocks voltage-sensitive calcium channels in the blood vessels, by inhibiting the ion-control gating mechanisms, thereby preventing calcium levels increase

Indications

- Prophylaxis and treatment of angina
- Chronic anal fissure
- Mild to moderate hypertension
- Angina

Contraindications

- With systemic use acute porphyrias
- Left ventricular failure with pulmonary congestion
- Second- or third degree AV block (unless pacemaker fitted)
- Severe bradycardia
- Sick sinus syndrome

Cautions

- With systemic use bradycardia (avoid if severe)
- First degree AV block
- Heart failure
- Prolonged PR interval
- Significantly impaired left ventricular function

Side effects

Common/very common : Cardiac conduction disorders, constipation, gastrointestinal discomfort, malaise, skin reactions
Rare/very rare : Dry mouth, Arrhythmias, diarrhea, insomnia, nervousness, postural hypotension

Overdose

With oral use in overdose, diltiazem has a profound cardiac depressant effect causing hypotension and arrhythmias, including complete heart block and asystole.

Pregnancy

With systemic use Avoid.

Breast feeding

With systemic use Significant amount present in milk - no evidence of harm but avoid unless no safer alternative.

Adult Dose

From 60 mg 3 times a day to maximum 360 mg per day, different doses according to the clinical condition.
(Refer BNF)

3 Antibiotics

Amoxicillin

Mechanism of Action

Amoxicillin is in the class of beta-lactam antibiotics. Beta-lactams act by binding to penicillin-binding proteins that inhibit a process called transpeptidation, leading to activation of autolytic enzymes in the bacterial cell wall. This process leads to lysis of the cell wall, and thus, the destruction of the bacterial cell. This type of activity is referred to as bactericidal killing.

Indications

- Susceptible infections including urinary-tract infections, sinusitis, uncomplicated community acquired pneumonia, salmonellosis, oral infections
- Acute exacerbation of bronchiectasis & chronic obstructive pulmonary disease
- Acute cough (if systemically very unwell or at higher risk of complications)
- Acute otitis media
- Lyme disease (erythema migrans, affecting cranial nerves or peripheral nervous system)
- Lyme arthritis

- Anthrax
- Dental abscess
- Urinary-tract infections
- Listerial meningitis
- Endocarditis
- Helicobacter pylori eradication in combination with metronidazole and omeprazole

Cautions

- **General cautions :** increased risk of erythematous rashes in Acute & chronic lymphocytic leukaemia, cytomegalovirus infection, glandular fever; maintain adequate hydration with high doses (particularly during parenteral therapy)
- **Specific cautions :** With intravenous use accumulation of sodium can occur with high parenteral doses

Side effects

Rare/very rare : Colitis haemorrhagic . Crystalluria, dizziness, hyperkinesia, hypersensitivity vasculitis, mucocutaneous candidiasis, Jarisch-Herxheimer reaction

Pregnancy

Not known to be harmful.

Breast feeding

Trace amount in milk, but appropriate to use.

Adult Dose

500 mg every 8 hours, increased if necessary to 1 g every 8 hours

Pediatric dose

125 mg – 500mg 3 times a day
Different doses according to various clinical conditions, Refer BNF for Children

Azithromycin

Mechanism of Action

Azithromycin prevents bacteria from growing by interfering with their protein synthesis. It binds to the 50S subunit of the bacterial ribosome, thus inhibiting translation of mRNA.

Indications

- Trachomatous conjunctivitis caused by Chlamydia trachomatis
- Purulent bacterial conjunctivitis

Side effects

Common/very common : Eye discomfort
Uncommon : Eye allergy

Pregnancy

Azithromycin and other macrolide antibiotics are generally accepted to be safe in pregnancy

Breast feeding

low levels of azithromycin in breastmilk, therefore it would not be expected to cause adverse effects in breastfed infants

Adult Dose

To the eye : Apply twice daily for 3 days, review if no improvement after 3 days of treatment

Pediatric dose

To the eye : Apply twice daily for 3 days, review if no improvement after 3 days of treatment

Cefuroxime

Mechanism of Action

It's a Cephalosporin group antibiotic, exerts bactericidal activity by interfering with bacterial cell wall synthesis and inhibiting cross-linking of the peptidoglycan. The cephalosporins are also thought to play a role in the activation of bacterical cell autolysins which may contribute to bacterial cell lysis.

Indications

- Susceptible infections due to Gram-positive and Gram negative bacteria
- Lyme disease
- Lower urinary-tract infection
- Pyelonephritis
- Surgical prophylaxis
- Open fractures, prophylaxis

Cautions

With intracameral use combined operations with cataract surgery, complicated cataracts, reduced corneal endothelial cells (less than 2000), severe risk of infection, severe thyroid disease

Side effects

Uncommon : with parenteral use gastrointestinal disorder, drug fever, hepatic disorders, Jarisch-Herxheimer reaction, serum sickness

Pregnancy

Not known to be harmful.

Breast feeding

Present in milk in low concentration, but appropriate to use.

Adult Dose

250mg-500mg twice daily, Doses vary according to age and clinical condition
Refer BNF

Pediatric dose

10mg – 250mg/kg
Doses vary according to age and clinical condition
Refer BNF

Cephalexin (Cefalexin)

Mechanism of Action

It's a Cephalosporin group antibiotic, exerts bactericidal activity by interfering with bacterial cell wall synthesis and inhibiting cross-linking of the peptidoglycan. The cephalosporins are also thought to play a role in the activation of bacterical cell autolysins which may contribute to bacterial cell lysis.

Indications

- Susceptible infections due to sensitive Gram-positive and Gram-negative bacteria
- Serious susceptible infections due to sensitive Grampositive and Gram-negative bacteria

Side effects

Agitation, arthritis, confusion, fatigue, gastrointestinal discomfort, genital pruritus, hallucination, hepatitis (transient), hypersensitivity, jaundice cholestatic (transient), joint disorders, vaginal discharge

Pregnancy

Not known to be harmful.

Breast feeding

Present in milk in low concentration, but appropriate to use.

Adult Dose

250 mg every 6 hours or 500 mg every 8–12 hours

Doses and frequency vary according clinical condition, Refer BNF

Pediatric dose

Oral :

Child 1months–11 years :12.5 mg/kg twice daily,

Child 12–17 years: 500 mg 2–3 times a day

Doses vary according clinical condition, Refer BNF for Children

Ceftriaxone

Mechanism of Action

Ceftriaxone is a third-generation cephalosporin that inhibits bacterial cell wall synthesis by binding to penicillin-binding proteins (PBPs), preventing peptidoglycan cross-linking. This weakens the bacterial cell wall, leading to autolysin activation and cell lysis.

Indications

- Bacterial meningitis
- Community-acquired pneumonia
- Hospital-acquired pneumonia
- Urinary tract infections (UTIs)
- Gonorrhea
- Sepsis
- Skin and soft tissue infections
- Intra-abdominal infections
- Bone and joint infections
- Lyme disease

Contraindications

- Hypersensitivity to ceftriaxone or other cephalosporins
- Neonates with hyperbilirubinemia (risk of kernicterus)
- Concurrent use with calcium-containing IV solutions in neonates (risk of precipitation)

Contraindications

- Renal and hepatic impairment
- History of penicillin allergy (risk of cross-reactivity)
- Clostridium difficile-associated diarrhea
- Prolonged use may lead to superinfection

Side Effects

- Diarrhea, nausea, vomiting
- Hypersensitivity reactions (rash, anaphylaxis)
- Pain at injection site (IM)
- Pseudomembranous colitis
- Hemolytic anemia
- Thrombocytopenia
- Elevated liver enzymes

Pregnancy

Generally considered safe, but use only if clearly needed

Breast feeding

Excreted in breast milk in small amounts; generally considered safe, but monitor for diarrhea or candidiasis in the infant.

Adult Dose

- Usual dose: 1–2 g IV/IM once daily or in divided doses
- Severe infections: Up to 4 g/day IV
- Gonorrhea: 500 mg IM single dose
- Meningitis: 2 g IV every 12 hours

Pediatric dose

- Mild to moderate infections: 50–100 mg/kg/day IV/IM in 1–2 doses (Max: 2 g/day)
- Meningitis: 100 mg/kg/day IV in divided doses (Max: 4 g/day)
- Neonatal infections: 20–50 mg/kg/day IV/IM (Avoid in neonates with jaundice)

Ciprofloxacin

Mechanism of Action

Ciprofloxacin is a bactericidal antibiotic of the fluoroquinolone drug class. It acts on bacterial topoisomerase II (DNA gyrase) and topoisomerase IV. Ciprofloxacin's targeting of the alpha subunits of DNA gyrase prevents it from supercoiling the bacterial DNA which prevents DNA replication.

Indications

- Fistulating Crohn's disease
- Respiratory-tract infections
- Pseudomonal lower respiratory-tract infection in cystic fibrosis
- Urinary-tract infections
- Acute uncomplicated cystitis in women
- Acute or chronic prostatitis
- Gonorrhoea
- Surgical prophylaxis
- Anthrax (treatment and post-exposure prophylaxis)
- Prevention of secondary case of meningococcal meningitis

Cautions

- Avoid excessive alkalinity of urine (risk of crystalluria)
- Ensure adequate fluid intake (risk of crystalluria)
- Heart failure with reduced left ventricular ejection fraction, symptomatic arrhythmias, Bradycardia, Acute myocardial infarction, Congenital long QT syndrome & Electrolyte disturbances (risk factor for QT interval prolongation)

Side effects

Common/very common : Arthropathy (in children)

Rare/very rare : Bone marrow depression, crystalluria, erythema nodosum, haematuria, intracranial pressure increased, leukocytosis, migraine, muscle tone increased, status epilepticus

Pregnancy

A single dose of ciprofloxacin may be used for the prevention of a secondary case of meningococcal meningitis.

Breast feeding

Amount too small to be harmful but manufacturer advises avoid.

Adult Dose

Oral : 250–750 mg twice daily, Doses and frequency vary according clinical condition, Refer BNF

Pediatric dose

Starts from 30 mg/kg, Doses and frequency vary according clinical condition & age, Refer BNF for children

Clarithromycin

Mechanism of Action

Clarithromycin, a macrolide antibiotic, inhibits bacterial protein synthesis by binding to the bacterial 50S ribosomal subunit. Binding inhibits peptidyl transferase activity and interferes with amino acid translocation during the translation and protein assembly process, and prevents bacterial protein synthesis.

Indications

- Respiratory-tract infections
- Skin and soft-tissue infections
- Acute exacerbation of chronic obstructive pulmonary disease & bronchiectasis
- Acute cough [if systemically very unwell or at higher risk of complications]
- Acute otitis media
- Prevention of pertussis
- Helicobacter pylori eradication in combination with a proton pump inhibitor and amoxicillin/metronidazole

Side effects

Uncommon : burping, dry mouth, muscle complaints, oral disorders, thrombocytosis, tremor, with oral use epistaxis, with parenteral use cardiac arrest, dyskinesia, hemorrhage, loss of consciousness, pulmonary embolism

Pregnancy

Manufacturer advises avoid, particularly in the first trimester, unless potential benefit outweighs risk.

Breast feeding

Manufacturer advises avoid unless potential benefit outweighs risk- present in milk.

Adult Dose

250mg-500 mg twice daily

Pediatric dose

Starts from 7.5 mg/kg twice daily to 500 mg twice daily.
Doses vary according clinical condition & age, Refer BNF for children

Clindamycin

Mechanism of Action

It is a bacterial protein synthesis inhibitor by inhibiting ribosomal translocation in a similar way to macrolides. It does so by binding to the 23S RNA of the 50S subunit of the ribosome. Clindamycin is bacteriostatic.

Indications

- Staphylococcal bone and joint infections such as Osteomyelitis,Peritonitis, Intra-abdominal sepsis, Meticillin-resistant Staphylococcus aureus (MRSA) in bronchiectasis, bone and joint infections, and skin and soft-tissue infections, Erysipelas or cellulitis in penicillin-allergic patients (alternative to macrolides)
- Treatment of mild to moderate pneumocystis pneumonia (in combination with primaquine)
- Treatment of falciparum malaria (to be given with or following quinine)

Contraindications

Diarrhoeal states

Cautions

Avoid in acute porphyrias, middle aged & elderly women, especially after an operation (antibiotic-associated colitis more common)

Side effects

Common or very common : skin reactions, with oral use abdominal pain, antibiotic associated colitis, diarrhoea (discontinue)
Uncommon : with oral use nausea, vomiting

Pregnancy

Manufacturer advises not known to be harmful in the second and third trimesters; use with caution in the first trimester—limited data.

Breast feeding

Specialist sources indicate use with caution—present in milk. Monitor infant for effects on the gastrointestinal flora such as diarrhoea, candidiasis, or rarely, blood in the stool indicating possible antibiotic associated colitis.

Adult Dose

150–300 mg every 6 hours or 600 mg every 8 hours
Doses vary according clinical condition & age, Refer BNF

Pediatric dose

3–6 mg/kg 4 times a day (max. per dose 450 mg)
Doses vary according clinical condition & age, Refer BNF for children

Co-amoxiclav

Mechanism of Action

Co-amoxiclav is a combination of Amoxicillin and Clavulanic acid. Clavulanic acid blocks the chemical defense, known as beta-lactamase, that some bacteria produce against penicillin group antibiotics such as amoxicillin. Co-amoxiclav is active against bacterial infections that have become resistant to amoxicillin.

Indications

- Infections due to beta-lactamase-producing strains (where amoxicillin alone not appropriate), including respiratory tract infections, bone and joint infections, genito-urinary and abdominal infections, cellulitis and animal bites.
- Severe dental infection with spreading cellulitis or not responding to first-line antibacterial
- Surgical prophylaxis
- Acute exacerbation of bronchiectasis, chronic obstructive pulmonary disease, sinusitis, otitis media.

Contraindications

- History of co-amoxiclav associated jaundice or hepatic dysfunction
- history of penicillin associated jaundice or hepatic dysfunction

Cautions

- Increased risk of erythematous rashes in
  - Acute lymphocytic leukaemia
  - Chronic lymphocytic leukaemia
  - Cytomegalovirus infection
  - Glandular fever
- Maintain adequate hydration with high doses (particularly during parental therapy)
- With Intravenous use, accumulation of electrolytes contained in parenteral preparations can occur with high doses

Side effects

Common/very common : increased risk of infection

Uncommon : dizziness, dyspepsia, headache, akathisia, black hairy tongue

Pregnancy

Not known to be harmful.

Breast feeding

Trace amount in milk, but appropriate to use.

Adult Dose

Oral : 250/125 mg every 8 hours; increased to 500/125 mg every 8 hours in severe infection.
Intravenous Injection : 1.2 g every 8 hours

Pediatric dose

Doses and frequency vary according clinical condition & age, Refer BNF for children

Co-trimoxazole

Mechanism of Action

Co-trimoxazole, generally bactericidal, a combination of trimethoprim-sulfamethoxazole. It acts by sequential blockade of folic acid enzymes in the synthesis pathway. The sulfamethoxazole component inhibits formation of dihydrofolic acid from para-aminobenzoic (PABA), whereas trimethoprim inhibits dihydrofolate reductase. Both drugs block folic acid synthesis, preventing bacterial cell synthesis of essential nucleic acids.

Indications

- Treatment of susceptible infections
- Acute exacerbation of chronic obstructive pulmonary disease
- Treatment of Pneumocystis jirovecii (Pneumocystis carinii) infections (undertaken where facilities for appropriate monitoring available—consult microbiologist and product literature)
- Prophylaxis of Pneumocystis jirovecii (Pneumocystis carinii) infections

Contraindications

- Acute porphyrias

Cautions

- Asthma
- Avoid in blood disorders (unless under specialist supervision)
- Avoid in infants under 6 weeks (except for treatment or prophylaxis of pneumocystis
- Pneumonia) because of the risk of kernicterus
- Elderly (increased risk of serious side-effects)
- G6PD deficiency (risk of haemolytic anaemia)
- Maintain adequate fluid intake
- Predisposition to folate deficiency
- Predisposition to hyperkalaemia

Side effects

Common or very common : Diarrhoea , electrolyte imbalance, fungal overgrowth . headache . nausea . skin reactions

Uncommon : Vomiting, Agranulocytosis, angioedema, aplastic anaemia, appetite decreased, arthralgia

Pregnancy

- Teratogenic risk in first trimester (trimethoprim a folate antagonist).
- Neonatal haemolysis and methaemoglobinaemia in third trimester
- Fear of increased risk of kernicterus in neonates appears to be unfounded.

Breast feeding

Small risk of kernicterus in jaundiced infants and of haemolysis in G6PD-deficient infants (due to sulfamethoxazole).

Adult Dose

960 mg every 12 hours, increased to 1.44 g every 12 hours, increased dose used in severe infection

Pediatric dose

120 mg - 960 mg twice daily, alternatively 24 mg/kg twice daily

Doxycycline

Mechanism of Action

Doxycycline is a tetracycline group, broad spectrum antibiotic. It inhibits the synthesis of bacterial proteins by binding to the 30S ribosomal subunit, which is only found in bacteria. This prevents the binding of transfer RNA to messenger RNA, so new proteins cannot be made. This stops bacterial growth giving the immune system time to kill and remove the bacteria.

Indications

- Susceptible infections (e.G. Chlamydia, rickettsia and mycoplasma)
- Acute sinusitis & cough [if systemically very unwell or at higher risk of complications]
- Acute exacerbation of bronchiectasis & chronic obstructive pulmonary disease.
- Severe infections (including refractory urinary-tract infections)
- Rosacea & Papulopustular facial rosacea (without ocular involvement)
- Acne

- Early syphilis, late latent syphilis, neurosyphilis
- Uncomplicated genital chlamydia
- Non gonococcal urethritis
- Pelvic inflammatory disease
- Lyme disease, lyme arthritis,
- Anthrax
- Prophylaxis of malaria, adjunct to quinine in treatment of *plasmodium falciparum* malaria
- Periodontitis
- Rocky mountain spotted fever

Cautions

- Alcohol dependence

Side effects

Common/very common : Dyspnoea, hypotension, peripheral oedema, tachycardia
Uncommon : Gastrointestinal discomfort

Pregnancy

When travel to malarious areas is unavoidable during pregnancy, doxycycline can be used for malaria prophylaxis, and if the entire course of doxycycline can be completed before 15 weeks' gestation.

Adult Dose

Initially 200 mg daily in 1–2 divided doses for 1 day, then maintenance 100 mg daily

Pediatric dose

Child 12–17 years: Initially 200 mg daily in 1–2 divided doses for 1 day, then maintenance 100mg daily

Flucloxacillin

Mechanism of Action

Like other β-lactam antibiotics, flucloxacillin acts by inhibiting the synthesis of bacterial cell walls. It inhibits cross-linkage between the linear peptidoglycan polymer chains that make up a major component of the cell wall of Gram-positive bacteria.

Indications

- Infections due to beta-lactamase-producing staphylococci including otitis externa, Adjunct in pneumonia, impetigo, cellulitis
- Endocarditis (in combination with other antibacterial if necessary)
- Osteomyelitis
- Surgical prophylaxis
- Staphylococcal lung infection in cystic fibrosis
- Prevention of Staphylococcus aureus lung infection in cystic fibrosis-primary prevention
- Prevention of Staphylococcus aureus lung infection in cystic fibrosis-secondary prevention

Cautions

- With intravenous use accumulation of electrolytes can occur with high doses

Side effects

Common/very common : with oral use gastrointestinal disorder

Rare or very rare : arthralgia, fever, eosinophilia, myalgia

Pregnancy

Not known to be harmful.

Breast feeding

Trace amounts in milk, but appropriate to use.

Adult Dose

250–500 mg 4 times a day

Pediatric dose

62.5- 500 mg 4 times a day

Gentamycin

Mechanism of Action

Gentamicin is and Aminoglycoside, "irreversibly" bind to specific 30S-subunit of ribosome. This leads to interference with the initiation complex, misreading of mRNA so incorrect amino acids are inserted into the polypeptide leading to nonfunctional or toxic peptides and ultimately inhibits bacterial protein synthesis.

Indications

- Gram-positive bacterial endocarditis or HACEK endocarditis
- Septicaemia
- Meningitis and other CNS infections
- Biliarytract infection
- Acute pyelonephritis
- Endocarditis
- Pneumonia in hospital patients
- Adjunct in Listerial meningitis
- Prostatitis
- Surgical prophylaxis

Side effects

Antibiotic associated colitis
Blood disorder
Depression
Encephalopathy
Hallucination
Hepatic reaction
Neurotoxicity
Peripheral neuropathy
Seizure
Stomatitis
Vestibular damage

Adult Dose

Intravenous infusion : 1 mg/kg every 12 hours

Levofloxacin

Mechanism of Action

Levofloxacin is a bactericidal antibiotic of the fluoroquinolone drug class. It acts on bacterial topoisomerase II (DNA gyrase) and topoisomerase IV. Levofloxacin's targeting of the alpha subunits of DNA gyrase prevents it from supercoiling the bacterial DNA which prevents DNA replication.

Indications

- Acute sinusitis
- Acute exacerbation of chronic obstructive pulmonary disease
- Acute exacerbation of bronchiectasis
- Community-acquired pneumonia
- Urinary-tract infections
- Chronic prostatitis
- Complicated skin & soft-tissue
- Inhalation of anthrax (treatment and post-exposure prophylaxis)

Cautions

- History of psychiatric illness
- Risk factors for QT interval prolongation E.G :
  - Electrolyte disturbances
  - Acute myocardial infarction
  - Heart failure with reduced left ventricular ejection fraction
  - Bradycardia
  - Congenital long QT syndrome
  - History of symptomatic arrhythmias

Side effects

Common/very common : when used by inhalation bronchial secretion changes, dysphonia, haemoptysis, weight decreased
Rare/very rare : hyperbilirubinaemia, joint stiffness, when used by inhalation costochondritis, with oral and intravenous use paranoia

Breast feeding

Manufacturer advises avoid.

Adult Dose

Oral : 500 mg once daily/ twice daily, depends on the clinical condition

Meropenem

Mechanism of Action

Meropenem is a broad-spectrum carbapenem antibiotic. It inhibits bacterial cell wall synthesis like other β-lactam antibiotics, thus it acts by binding to penicillin-binding proteins that inhibit a process called transpeptidation, leading to activation of autolytic enzymes in the bacterial cell wall. This process leads to lysis of the cell wall, and thus, the destruction of the bacterial cell. Meropenem is bactericidal except against Listeria monocytogenes, where it is bacteriostatic.

Indications

- Aerobic and anaerobic Gram-positive and Gram-negative Infections
- Hospital-acquired septicaemia
- Exacerbations of chronic lower respiratory-tract infection in cystic fibrosis
- Meningitis
- Endocarditis (in combination with another antibacterial)

Side effects

Common/very common : Abdominal pain, diarrhea, headache, inflammation, nausea, pain, skin reactions, thrombocytosis, vomiting
Uncommon : SeizureAgranulocytosis, antibiotic associated colitis, eosinophilia, haemolytic anaemia, increased risk of infection, leucopenia, neutropenia, paraesthesia, severe cutaneous adverse reactions (SCARs), thrombocytopenia, thrombophlebitis

Pregnancy

Use only if potential benefit outweighs risk—no information available.

Breast feeding

Unlikely to be absorbed (however, manufacturer advises avoid).

Adult Dose

Intravenous infusion, or by intravenous injection : 0.5–1 g every 8 hours

Metronidazole

Mechanism of Action

Metronidazole is of the nitroimidazole class. It inhibits nucleic acid synthesis by disrupting the DNA of microbial cells. They also lead to production of toxic metabolites, which may damage DNA of replicating organisms, usually anaerobic bacteria and protozoans

Indications

- Anaerobic infections
- Helicobacter pylori eradication; in combination with amoxicillin and omeprazole
- Fistulating Crohn's disease
- Leg ulcers and pressure sores
- Bacterial vaginosis
- Pelvic inflammatory disease
- Acute ulcerative gingivitis
- Acute oral infections
- Invasive intestinal amoebiasis & Extra-intestinal amoebiasis (including liver abscess)
- Urogenital trichomoniasis
- Giardiasis
- Established case of tetanus

Cautions

- With vaginal use not recommended during menstruation
- Some systemic absorption may occur with vaginal gel

Side effects

Common/very common : with systemic use dry mouth, myalgia, nausea, oral disorders, taste altered, vomiting
With vaginal use pelvic discomfort, vulvovaginal candidiasis, vulvovaginal disorders
Uncommon : with systemic use asthenia, headache, leucopenia (with long term or intensive therapy)
With vaginal use menstrual cycle irregularities, vaginal haemorrhage

Pregnancy

With systemic use manufacturer advises avoidance of high dose regimens; use only if potential benefit outweighs risk.

Breast feeding

With systemic use Significant amount in milk; manufacturer advises avoid large single doses though otherwise compatible & may give milk a bitter taste.

Adult Dose

From 400 mg – 1g 3 times a day
Different doses according to various clinical conditions, Refer BNF

Pediatric dose

From 7.5 mg/kg every 12 hours to 1 g 3 times a day
Different doses according to various clinical conditions, Refer BNF for Children

Piperacillin-Tazobactam

Mechanism of Action

Piperacillin: Extended-spectrum β-lactam antibiotic (penicillin group) that inhibits bacterial cell wall synthesis by binding to penicillin-binding proteins (PBPs).
Tazobactam: A β-lactamase inhibitor that protects piperacillin from enzymatic degradation by β-lactamase-producing bacteria.

Indications

- Hospital-acquired pneumonia (HAP)
- Community-acquired pneumonia (CAP)
- Intra-abdominal infections
- Skin and soft tissue infections
- Complicated urinary tract infections
- Febrile neutropenia (empirical therapy)
- Sepsis

Contraindications

- Hypersensitivity to penicillins, cephalosporins, or β-lactam antibiotics
- Severe renal impairment (without appropriate dose adjustment)

Cautions

- Renal impairment (dose adjustment required)
- Patients with a history of seizures (may lower seizure threshold)
- Risk of Clostridium difficile-associated diarrhea
- May cause sodium overload in patients with heart failure or hypertension

Side effects

- **Common:** Diarrhea, nausea, vomiting, headache, rash
- **Serious:** Hypersensitivity reactions (anaphylaxis), thrombocytopenia, leukopenia, nephrotoxicity, hepatotoxicity, seizures (rare)

Pregnancy

- No evidence of fetal harm in animal studies, but limited human data.
- Use only if clearly needed.

Breast feeding

- Excreted in breast milk in small amounts.
- Generally considered safe, but monitor for diarrhea or allergic reactions in the infant.

Adult Dose

- **Standard dose:** 3.375 g (Piperacillin 3 g + Tazobactam 0.375 g) IV every 6 hours
- **Severe infections:** 4.5 g IV every 6-8 hours
- **Renal impairment (CrCl < 40 mL/min):** Dose adjustment required

Pediatric dose

- **Infants (>2 months) & children:** 80–100 mg/kg/day (piperacillin component) IV in divided doses every 6–8 hours
- **Severe infections:** Up to 300 mg/kg/day (piperacillin component) in divided doses
- **Neonates (<2 months):** 100 mg/kg/day in divided doses every 8–12 hours

Vancomycin

Mechanism of Action

The bactericidal action of vancomycin results from inhibition of cell-wall biosynthesis. Vancomycin forms hydrogen bonds & prevents incorporation of N-acetylmuramic acid (NAM)- and N-acetylglucosamine (NAG)-peptide subunits from being incorporated into the peptidoglycan matrix, which forms the major structural component of Gram-positive cell walls. Additionally, vancomycin alters bacterial-cell-membrane permeability and RNA synthesis. Vancomycin is not active in vitro against gram-negative bacilli, mycobacteria, or fungi.

Indications

- Clostridium difficile infection
- Complicated skin and soft tissue infections, Bone infections, Joint infections
- Community & Hospital acquired pneumonia [including ventilator-associated pneumonia]
- Infective endocarditis
- Acute bacterial meningitis
- Bacteremia

Contraindications

- With intravenous use : Previous hearing loss

Cautions

- With oral use systemic absorption may be enhanced in patients with inflammatory disorders of the intestinal mucosa or with Clostridium difficile-induced pseudomembranous colitis (increased risk of adverse reactions)
- Caution if teicoplanin sensitivity.

Side effects

Agranulocytosis, dizziness, eosinophilia, nephritis tubulointerstitial, neutropenia (more common after 1 week or cumulative dose of 25g), renal failure, severe cutaneous adverse reactions (SCARs), skin reactions, thrombocytopenia . tinnitus , vertigo

With intravenous use Back pain, bradycardia, cardiac arrest & cardiogenic shock (on rapid intravenous injection), chest pain, dyspnea, hearing loss, hypotension, pseudomembranous enterocolitis, wheezing

Pregnancy

- Manufacturer advises use only if potential benefit outweighs risk.
- Monitoring Plasma-vancomycin concentration monitoring essential to reduce risk of fetal toxicity.

Breast feeding

Present in milk—significant absorption following oral administration unlikely.

Adult Dose

Oral : 125 mg every 6 hours; increased if necessary to 500 mg every 6 hours
Intravenous infusion : 15–20 mg/kg every 8–12 hours (max. per dose 2 g) adjusted according to plasma-concentration.

4 Anticoagulants

Apixaban

Mechanism of Action

Apixaban is a highly selective, orally bioavailable, and reversible direct inhibitor of free and clot-bound factor Xa. (Factor Xa catalyzes the conversion of prothrombin to thrombin, the final enzyme in the coagulation cascade that is responsible for fibrin clot formation)

Indications

- Prophylaxis of venous thromboembolism following knee & replacement surgery
- Treatment of deep-vein thrombosis & pulmonary embolism
- Prophylaxis of recurrent deep-vein thrombosis & pulmonary embolism
- Prophylaxis of stroke and systemic embolism in nonvalvular atrial fibrillation and at least one risk factor (such as previous stroke or transient ischaemic attack, symptomatic heart failure, diabetes mellitus, hypertension, or age 75 years and over)

Contraindications

- Active, clinically significant bleeding
- Risk factors for major bleeding

Cautions

- Anaesthesia with postoperative indwelling epidural catheter (risk of paralysis – monitor neurological signs and wait 20–30 hours after apixaban dose before removing catheter and do not give next dose until at least 5 hours after catheter removal)
- Prosthetic heart valve (efficacy not established)
- Risk of bleeding

Side effects

Common/very common : Anaemia, haemorrhage, nausea, skin reactions

Rare : Central nervous system haemorrhage, hypotension, post procedural haematoma, thrombocytopenia, wound complications

Pregnancy

Manufacturer advises avoid—no information available.

Breast feeding

Manufacturer advises avoid—present in milk in animal studies.

Adult Dose

Oral : 2.5 mg twice daily. May be increased to 10mg depend on the clinical condition.
Refer BNF

Enoxaparin sodium

Mechanism of Action

Enoxaparin binds to and potentiates antithrombin (a circulating anticoagulant) to form a complex that irreversibly inactivates clotting factor Xa

Indications

- Treatment of venous thromboembolism in pregnancy
- Prophylaxis of deep-vein thrombosis, especially in medical & surgical patientsTreatment of deep-vein thrombosis & pulmonary embolism in uncomplicated patients with low risk of recurrence
- Treatment of deep-vein thrombosis & pulmonary embolism in patients with risk factors
- Treatment of Unstable angina, Non-ST-segment-elevation myocardial infarction & acute ST-segment elevation myocardial infarction
- Prevention of clotting in extracorporeal circuits

Cautions

- Low body-weight (increased risk of bleeding)

Side effects

Common/ very common : Hypersensitivity
Rare : Cutaneous vasculitis, eosinophilia, haemorrhagic anaemia, headache, hepatic disorders

Pregnancy

Not known to be harmful, low molecular weight heparins do not cross the placenta. Multidose vial contains benzyl alcohol—avoid.

Breast feeding

Due to the relatively high molecular weight of enoxaparin and inactivation in the gastrointestinal tract, passage into breast-milk and absorption by the nursing infant are likely to be negligible; however manufacturers advise avoid.

Adult Dose

Subcutaneous injection : Starts from 20 mg for 1 dose.
Refer BNF

Fondaparinux sodium

Mechanism of Action

Fondaparinux is a synthetic pentasaccharide that binds antithrombin and accelerates its inhibition of factor Xa.

Indications

- Prophylaxis of venous thromboembolism in patients after undergoing major orthopaedic surgery of the hip or leg, or abdominal surgery & in medical patients immobilized because of acute illness
- Treatment of superficial-vein thrombosis
- Treatment of unstable angina and non-ST-segment elevation myocardial infarction
- Treatment of ST-segment elevation myocardial infarction
- Treatment of deep-vein thrombosis and pulmonary embolism

Contraindications

- Active bleeding
- Bacterial endocarditis

Cautions

- Active gastro-intestinal ulcer disease
- Bleeding disorders
- Brain surgery
- Elderly patients
- Low bodyweight
- Ophthalmic surgery
- Recent intracranial haemorrhage
- Risk of catheter thrombus during percutaneous coronary intervention
- Spinal or epidural anaesthesia (risk of spinal haematoma—avoid if using treatment doses)
- Spinal surgery

Side effects

Common/very common : anaemia, haemorrhage
Rare/ very rare : anxiety, confusion, constipation, cough, diarrhea, dizziness, drowsiness, fatigue, gastrointestinal discomfort genital oedema headache, hyperbilirubinaemia, hypersensitivity, hepatic function abnormal, nausea, oedema, platelet abnormalities, skin reactions, thrombocytopenia, vomiting, wound secretion

Pregnancy

Manufacturer advises avoid unless potential benefit outweighs possible risk—no information available.

Breast feeding

Present in milk in animal studies - manufacturer advises avoid.

Adult Dose

Subcutaneous injection : 2.5 mg once daily

Heparin

Mechanism of Action

Heparin binds to the enzyme inhibitor antithrombin III (AT) by a conformational change. The activated AT then inactivates thrombin, factor Xa and other proteases. The rate of inactivation of these proteases by AT can increase by up to 1000-fold due to the binding of heparin & prevents clotting

Indications

- Treatment of pulmonary embolism
- Treatment of unstable angina
- Treatment of acute peripheral arterial occlusion
- Treatment of deep-vein thrombosis
- Thromboprophylaxis in medical, surgical patients& during pregnancy
- Haemodialysis
- Prevention of clotting in extracorporeal circuits
- To maintain patency of catheters, cannulas, other indwelling intravenous infusion devices

Side effects

- Adrenal insufficiency
- Hypokalaemia
- Rebound hyperlipidaemia

Pregnancy

- Does not cross the placenta
- Maternal osteoporosis reported after
- prolonged use multidose vials may contain benzyl alcohol—some manufacturers advise avoid.

Breast feeding

Not excreted into milk due to high molecular weight.

Adult Dose

Starts from 5000 units.
Doses vary depend on the clinical condition.
Refer BNF

Rivaroxaban

Mechanism of Action

Mechanism of action. Rivaroxaban competitively inhibits free and clot bound factor Xa.

Indications

- Prophylaxis of venous thromboembolism following knee & hip replacement surgery
- Treatment of deep-vein thrombosis & pulmonary embolism
- Prophylaxis of recurrent deep-vein thrombosis & recurrent pulmonary embolism
- Prophylaxis of stroke and systemic embolism in patients with non-valvular atrial fibrillation and with at least one of the following risk factors: congestive heart failure, hypertension, previous stroke or transient ischaemic attack, age 75 years, or diabetes mellitus
- Prophylaxis of atherothrombotic events following an acute coronary syndrome with elevated cardiac biomarkers (in combination with aspirin alone or aspirin and clopidogrel)

Prophylaxis of atherothrombotic events in patients with coronary artery disease or symptomatic peripheral artery disease at high risk of ischaemic events (in combination with aspirin)

Contraindications

- Active bleeding, oesophageal varices
- Malignant neoplasms
- Recent brain surgery, intracranial haemorrhage
- Recent gastro-intestinal ulcer
- Recent ophthalmic surgery, spine surgery
- Significant risk of major bleeding
- Vascular aneurysm
- When used for prophylaxis of atherothrombotic events following an acute coronary syndrome, previous stroke, transient ischaemic attack
- When used for prophylaxis of atherothrombotic events in patients with coronary artery disease or symptomatic peripheral artery disease

Cautions

- Anaesthesia with postoperative indwelling epidural catheter (risk of paralysis)
- Bronchiectasis
- Elderly
- Prosthetic heart valve
- Risk of bleeding
- Rivaroxaban should not be used as an alternative to unfractionated heparin in pulmonary embolism in patients with haemodynamic instability, or who may receive thrombolysis or pulmonary embolectomy
- Severe hypertension
- Vascular retinopathy
- When used for prophylaxis of atherothrombotic events following an acute coronary syndrome, patients with coronary artery disease or symptomatic peripheral artery

Side effects

Common/very common : Anaemia, asthenia, constipation, diarrhoea, dizziness, fever, gastrointestinal discomfort, haemorrhage, headache, hypotension, menorrhagia, nausea,

oedema, pain in extremity, post procedural anaemia, renal impairment, skin reactions, vomiting, wound complications
Rare/very rare : Vascular pseudoaneurysm, Allergic oedema, angioedema, dry mouth, hepatic disorders, intracranial haemorrhage, malaise

Pregnancy

Manufacturer advises avoid—toxicity in animal studies.

Breast feeding

Manufacturer advises avoid—present in milk in animal studies.

Adult Dose

10 mg once daily

Warfarin sodium

Mechanism of Action

Warfarin decreases blood clotting by blocking an enzyme called vitamin K epoxide reductase that reactivates vitamin K1. Without sufficient active vitamin K1, clotting factors II, VII, IX, and X have decreased clotting ability.

Indications

- Prophylaxis of embolization in rheumatic heart disease and atrial fibrillation
- Prophylaxis after insertion of prosthetic heart valve
- Prophylaxis and treatment of venous thrombosis and pulmonary embolism
- Transient ischaemic attacks

Contraindications

- Bleeding
- Intracranial Hemorrhage

Side effects

- Calciphylaxis
- Hepatic function abnormal

Pregnancy

Babies of mothers taking warfarin at the time of delivery need to be offered immediate prophylaxis with intramuscular phytomenadione (vitamin K1).

Breast feeding

Not present in milk in significant amounts and appears safe. Risk of haemorrhage which is increased by vitamin K deficiency.

Adult Dose

Oral : Initially 5–10 mg, to be taken on day 1; subsequent doses dependent on the prothrombin time, reported as INR (international normalised ratio)

5 Anticonvulsants

Carbamazepine

Mechanism of Action

Carbamazepine is a sodium channel blocker. It binds preferentially to voltage-gated sodium channels in their inactive conformation, which prevents repetitive and sustained firing of an action potential.

Indications

- Focal, Primary and secondary generalized tonic-clonic seizures
- Trigeminal neuralgia
- Prophylaxis of bipolar disorder unresponsive to lithium
- Adjunct in acute alcohol withdrawal
- Diabetic neuropathy

Cautions

- Cardiac disease
- History of haematological reactions to other drugs
- May exacerbate absence and myoclonic seizures
- Susceptibility to angle-closure glaucoma
- Skin reactions

Side effects

Common/very common : Dizziness, Dry mouth, eosinophilia, fatigue, fluid imbalance, gastrointestinal discomfort, headache, hyponatraemia, Leucopenia, movement disorders, nausea, oedema, skin reactions, thrombocytopenia, vision disorders, vomiting, weight increased

Rare/very rare : Aggression, agranulocytosis, diarrhea, eye disorders, Tremor, albuminuria .

Breast feeding

Amount probably too small to be harmful.

Monitor infant for possible adverse reactions.

Adult Dose

Initially 100–200 mg 1–2 times a day

Doses vary according to clinical condition. Refer BNF

Clonazepam

Mechanism of Action

Clonazepam's primary mechanism of action is the modulation of GABA function in the brain, by the benzodiazepine receptor, located on $GABA_A$ receptors, which, in turn, leads to enhanced GABAergic inhibition of neuronal firing.

Indications

- All forms of epilepsy
- Myoclonus
- Panic disorders (with or without agoraphobia) resistant to antidepressant therapy

Contraindications

- Coma
- Current alcohol & abuse
- Respiratory depression

Cautions

- Depression & Suicidal ideation
- Airways obstruction
- Brain damage, Cerebellar & Spinal ataxia
- Acute porphyrias

Side effects

- Alopecia
- Bronchial secretion increased (in children)
- Concentration impaired
- Coordination abnormal drooling (in children)
- Hypersalivation (in children)
- Incomplete precocious puberty (in children)
- Increased risk of fall (in adults)
- Increased risk of fracture (in adults)
- Muscle tone decreased
- Nystagmus
- Seizures
- Sexual
- Dysfunction
- Skin reactions
- Speech impairment

Breast feeding

- Present in milk, and should be avoided if possible during breast-feeding.
- All infants should be monitored for sedation, feeding difficulties, adequate weight gain, and developmental milestones.

Adult Dose

Initially 1 mg, once daily

Pediatric dose

Initially 250 µg to 1 mg, once daily

Diazepam

Mechanism of Action

Diazepam is a Benzodiazepine, It binds to specific receptors in the central nervous system. They thus cause an increased inhibitory effect of the neurotransmitter gamma-aminobutyric acid (GABA).

Indications

- Muscle spasm & Tetanus
- Anxiety, Insomnia associated with anxiety
- Acute panic attacks, anxiety and agitation
- Acute alcohol withdrawal
- Acute drug-induced dystonic reactions
- Acute Premedication
- Sedation
- Status epilepticus, Febrile convulsions, Convulsions due to poisoning
- Life-threatening acute drug-induced dystonic reactions
- Dyspnoea associated with anxiety in palliative care
- Pain of muscle spasm in palliative care

Contraindications

- Avoid injections containing benzyl alcohol in neonates
- Chronic psychosis (in adults)
- CNS depression
- Compromised airway
- Hyperkinesis
- Not for use alone to treat depression (or anxiety associated with depression) (in adults)
- Obsessional states
- Phobic states .
- Respiratory depression

Cautions

- Muscle weakness
- Organic brain changes
- Specific cautions
- High risk of venous thrombophlebitis with intravenous use (reduced by using an emulsion formulation)

Side effects

Common/very common : Appetite abnormal, concentration impaired, movement disorders, Muscle spasms, palpitations, sensory disorder, vomiting

Rare/very rare : Bradycardia, bronchial secretion increased, cardiac arrest, dry mouth, gynaecomastia, heart failure, Constipation, diarrhea, hypersalivation, Skin reactions, speech slurred, leucopenia, loss of consciousness, memory loss, respiratory arrest, sexual dysfunction, Syncope

Pregnancy

Women who have seizures in the second half of pregnancy should be assessed for eclampsia before any change is made to antiepileptic treatment.

Status epilepticus should be treated according to the standard protocol.

Breast feeding

Present in milk, and should be avoided if possible during breast-feeding.

Adult Dose

Different doses according to different clinical conditions.
Refer BNF

Pediatric dose

Different doses according to different clinical conditions & age.
Refer BNF for children

Gabapentin

Mechanism of Action

Gabapentin was designed to mimic the neurotransmitter GABA. It does not, however, bind to GABA receptors. Its mechanism of action as an antiepileptic agent likely involves its inhibition of the alpha 2-delta subunit of voltage-gated calcium channels

Indications

- Monotherapy or Adjunctive treatment of focal seizures with or without secondary generalisation
- Peripheral neuropathic pain
- Migraine prophylaxis
- Menopausal symptoms, particularly hot flushes, in women with breast cancer

Cautions

- Diabetes mellitus
- Elderly (in adults)
- High doses of oral solution in adolescents and adults with low body-weight

- History of psychotic illness & substance abuse
- Mixed seizures (including absences)

Side effects

Common/very common : anxiety, appetite abnormal, arthralgia, asthenia, behaviour abnormal, confusion, constipation, cough, depression, diarrhea, dizziness, drowsiness, dry mouth, dysarthria, dyspnea, emotional lability, flatulence, gait abnormal, gastrointestinal discomfort, headache, hypertension, increased risk of infection, insomnia, leucopenia, malaise, movement disorders, muscle complaints, nausea, nystagmus, oedema, pain, reflexes abnormal, seizure (in children), sensation abnormal, sexual dysfunction, skin reactions,thinking abnormal, tooth disorder, tremor, vasodilation, vertigo, visual impairment, vomiting

Rare : cognitive impairment , palpitations

Pregnancy

Manufacturer advises avoid unless benefit outweighs risk - toxicity reported.

Breast feeding

Present in milk - manufacturer advises
use only if potential benefit outweighs risk.

Adult Dose

Oral : Initially 300 mg once daily

Levetiracetam

Mechanism of Action

Levetiracetam is an antiepileptic drug and the action is modulation of synaptic neurotransmitter release through binding to the synaptic vesicle protein SV2A in the brain

Indications

- Monotherapy of focal seizures with or without secondary generalisation
- Adjunctive therapy of focal seizures with or without secondary generalisation
- Adjunctive therapy of myoclonic seizures and tonic-clonic seizures

Side effects

Common/very common : Anxiety, appetite decreased, asthenia, behaviour abnormal, cough, depression, diarrhoea, dizziness, drowsiness, Gastrointestinal discomfort, headache, increased risk of infection, insomnia, mood altered, movement disorders, nausea, skin reactions, vertigo, vomiting

Side effects

Rare/very rare : Acute kidney injury, agranulocytosis, hepatic disorders, hyponatraemia, neutropenia, pancreatitis, pancytopenia, personality disorder, rhabdomyolysis, severe cutaneous adverse reactions (SCARs), thinking abnormal

Pregnancy

The dose should be monitored carefully during pregnancy and after birth, and adjustments made on a clinical basis.
It is recommended that the fetal growth should be monitored.

Breast feeding

Present in milk—manufacturer advises avoid.

Adult Dose

Initially 250 mg once daily

Lorazepam

Mechanism of Action

Lorazepam is a benzodiazepine with anxiolytic, anti-anxiety, anticonvulsant, anti-emetic and sedative properties. Lorazepam enhances the effect of the inhibitory neurotransmitter gamma-aminobutyric acid on the GABA receptors by binding to a site that is distinct from the GABA binding site in the central nervous system.

Indications

- Short-term use in anxiety
- Short-term use in insomnia associated with anxiety
- Acute panic attacks
- Conscious sedation for procedures
- Status epilepticus, Febrile convulsions, Convulsions caused by poisoning

Cautions

- Muscle weakness
- organic brain changes
- parenteral administration

Side effects

Common/very common : Apnoea, asthenia, coma, disinhibition, extrapyramidal symptoms, hypothermia, memory loss, speech slurred, suicide attempt

Rare/very rare : Agranulocytosis, hyponatraemia, pancytopenia, SIADH, thrombocytopenia

Breast feeding

Benzodiazepines are present in milk, and should be avoided if possible during breast-feeding.

Adult Dose

Oral : 1–4 mg daily in divided doses

Refer BNF

Pediatric dose

Slow intravenous injection :

- Child 1 month–11 years: 100 micrograms/kg (max. per dose 4 mg)
- Child 12–17 years: 4 mg for 1 dose

Refer BNF for children

Phenytoin

Mechanism of Action

Phenytoin blocks the voltage gated sodium channels in brain. This blocks sustained high frequency repetitive firing of action potentials to protect against seizures

Indications

- Tonic-clonic seizures
- Focal seizures
- Prevention and treatment of seizures during or following neurosurgery or severe head injury
- Status epilepticus
- Acute symptomatic seizures associated with head trauma or neurosurgery

Contraindications

- Acute porphyrias
- With intravenous use Second- and third-degree heart block, sino-atrial block, sinus bradycardia, Stokes-Adams syndrome

Cautions

With intravenous use Heart failure . Hypotension, Injection solutions alkaline (irritant to tissues), Respiratory depression, resuscitation facilities must be available

Side effects

Agranulocytosis, bone disorders, bone fracture, bone marrow disorders, cerebrovascular insufficiency, coarsening of the facial features, confusion, constipation, dizziness, drowsiness, Dupuytren's contracture, dysarthria, eosinophilia, fever, gingival hyperplasia (maintain good oral hygiene), granulocytopenia, hair changes, headache, hepatic disorders, hypersensitivity, insomnia, joint disorders, leucopenia, lip swelling, lymphatic abnormalities, macrocytosis,

Pregnancy

Changes in plasma-protein binding make interpretation of plasma-phenytoin concentrations difficult—monitor unbound fraction.

Doses should be adjusted on the basis of plasma-drug concentration.

Breast feeding

Small amounts present in milk, but not known to be harmful.

Adult Dose

Initially 3–4 mg/kg daily
Refer BNF

Pediatric dose

Starts with 1.5–2.5 mg/kg twice daily
Refer BNF for children

Sodium valproate

Mechanism of Action

Anticonvulsant effect of Sodium valproate has been attributed to the blockade of voltage-gated sodium channels and increased brain levels of gamma-aminobutyric acid (GABA).

Indications

- All forms of epilepsy
- Initiation of valproate treatment
- Continuation of valproate treatment
- Migraine prophylaxis

Contraindications

- Acute porphyrias or suspected mitochondrial disorders (higher rate of acute liver failure and liver-related deaths)
- Personal or family history of severe hepatic dysfunction

Cautions

- Systemic lupus erythematosus

Side effects

Common/very common : Abdominal pain, agitation, alopecia (regrowth may be curly), anaemia, behaviourabnormal, concentration impaired, confusion, deafness, diarrhoea, drowsiness, haemorrhage, hallucination, headache, hepatic disorders, hypersensitivity, hyponatraemia, memory loss, menstrual cycle irregularities, movement disorders, nail disorder, nausea, nystagmus, oral disorders, seizures, stupor, thrombocytopenia, tremor, urinary disorders, vomiting, weight increased

Rare/very rare : Agranulocytosis, cerebral atrophy, cognitive disorder, dementia, diplopia, gynaecomastia, hyperammonaemia, hypothyroidism, infertility male, learning disability, myelodysplastic syndrome, Nephritis tubulointerstitial, polycystic ovaries, red blood cell abnormalities, rhabdomyolysis, severe cutaneous adverse reactions (SCARs), systemic lupus erythematosus (SLE),
urine abnormalities

Pregnancy

Specialist prenatal monitoring should be instigated when valproate has been taken in pregnancy.
The dose should be monitored carefully during pregnancy and after birth, and adjustments made on a clinical basis.

Breast feeding

Present in milk—risk of haematological disorders in breast-fed newborns and infants.

Adult Dose

Initially 600 mg daily in 1–2 divided doses, maximum 2.5 g per day

Pediatric dose

Child 1 month–11 years: Initially 10–15 mg/kg daily in 1–2 divided doses, maximum 600 mg per dose
Child 12–17 years: Initially 600 mg daily in 1–2 divided doses, maximum 2.5 g per day

6 Antidepressants

Amitriptyline hydrochloride

Mechanism of Action

Amitriptyline is in the tricyclic antidepressant (TCA) drug classification and acts by blocking the reuptake of both serotonin and norepinephrine neurotransmitters.

Indications

- Abdominal pain or discomfort (in patients who have not responded to laxatives, loperamide, or antispasmodics)
- Neuropathic pain
- Migraine prophylaxis
- Chronic tension type headache prophylaxis

Contraindications

- Arrhythmias
- During manic phase of bipolar disorder
- Heart block
- Immediate recovery period after myocardial infarction

Cautions

Cardiovascular disease, chronic constipation, diabetes, epilepsy, history of bipolar disorder, history of psychosis, hyperthyroidism (risk of arrhythmias), increased intra-ocular pressure, patients with a significant risk of suicide, phaeochromocytoma (risk of arrhythmias), prostatic hypertrophy, susceptibility to angle-closure glaucoma, urinary retention

Side effects

Common/very common : Anticholinergic syndrome, drowsiness, QT interval prolongation

Pregnancy

Use only if potential benefit outweighs risk.

Breast feeding

The amount secreted into breast milk is too small to be harmful

Adult Dose

Starts from 5mg, Refer BNF

Citalopram

Mechanism of Action

The mechanism of action of citalopram results from its inhibition of CNS neuronal reuptake of serotonin (5-HT)

Indications

- Depressive illness
- Panic disorder

Contraindications

- QT-interval prolongation

Cautions

- Susceptibility to QT-interval prolongation

Side effects

Common/ very common : Acute angle closure glaucoma, apathy, flatulence, hypersalivation, migraine, rhinitis

Rare/very rare : Cough, generalised tonic-clonic seizure, Hypokalaemia

Breast feeding

Present in milk - use with caution

Adult Dose

Starts from 10 mg once daily, maximum 40 mg per day
Refer BNF

Fluoxetine

Mechanism of Action

Fluoxetine is a selective serotonin reuptake inhibitor (SSRI) and as the name suggests, it exerts its therapeutic effect by inhibiting the presynaptic reuptake of the neurotransmitter serotonin

Indications

- Major depression
- Bulimia nervosa
- Obsessive-compulsive disorder
- Menopausal symptoms, particularly hot flushes, in women with breast cancer (except those taking tamoxifen)

Side effects

Common/very common : Chills, feeling abnormal, postmenopausal haemorrhage, uterine disorder, vasodilation, vision blurred
Rare/very rare: Buccoglossal syndrome, leucopenia, neutropenia, oesophageal pain, pharyngitis, respiratory disorders, serum sickness, speech disorder, vasculitis

Breast feeding

Present in milk - avoid.

Adult Dose

Initially 20 mg daily, maximum 60 mg per day

Sertraline

Mechanism of Action

Sertraline selectively inhibits the reuptake of serotonin (5-HT) at the presynaptic neuronal membrane, thereby increasing serotonergic activity. This results in an increased synaptic concentration of serotonin in the CNS, which leads to numerous functional changes associated with enhanced serotonergic neurotransmission.

Indications

- Depressive illness
- Obsessive-compulsive disorder
- Panic disorder
- Post-traumatic stress disorder
- Social anxiety disorder

Side effects

Common/very common : Chest pain, depression, gastrointestinal disorders, increased risk of infection, neuromuscular dysfunction, vasodilation

Rare or very : Balanoposthitis, bone disorder, cardiac disorder, coma, conversion disorder, diabetes mellitus, drug dependence, dysphonia, eye disorders, gait abnormal, genital discharge, glaucoma, hair texture abnormal, hepatic disorders, hiccups, hypercholesterolaemia, hypoglycaemia

Breast feeding

Not known to be harmful but consider discontinuing breast-feeding

Adult Dose

Initially 50 mg daily, maximum 200 mg per day

Venlafaxine

Mechanism of Action

Venlafaxine and its active metabolite, O-desmethylvenlafaxine (ODV), inhibit the reuptake of both serotonin and norepinephrine, thus increases the neurotransmitter activity in the brain

Indications

- Major depression
- Generalised anxiety disorder
- Social anxiety disorder
- Menopausal symptoms, particularly hot flushes, in women with breast cancer

Contraindications

- Conditions associated with high risk of cardiac arrhythmia
- Uncontrolled hypertension

Cautions

Diabetes, heart disease, history of bleeding disorders, history of Epilepsy, history or family history of mania, susceptibility to angle-closure glaucoma

Side effects

Common/ very common : Anxiety, appetite decreased, arrhythmias, asthenia, chills, confusion, constipation, depersonalisation, diarrhoea, dizziness, dry mouth, dyspnoea, headache, hot flush, hypertension, menstrualcycle irregularities

Rare/very rare : Agranulocytosis, angle closure glaucoma, bone marrow disorders, delirium, hepatitis, hyponatraemia, neuroleptic malignant syndrome

Pregnancy

Avoid unless potential benefit outweighs risk—toxicity in animal studies, Risk of withdrawal effects in neonate.

Breast feeding

Present in milk - avoid.

Adult Dose

Starts from 75 mg daily, maximum 225 mg per day

Refer BNF

7 Antiemetics

Cyclizine

Mechanism of Action

Cyclizine is a histamine H1 receptor antagonist of the piperazine class and It possesses antiemetic properties.

Indications

- Nausea, Vomiting, Vertigo, Motion sickness, Labyrinthine disorders
- Nausea and vomiting associated with vestibular disorders
- Nausea and vomiting in palliative care

Cautions

Epilepsy, glaucoma (in children), may counteract haemodynamic benefits of opioids, neuromuscular disorders -nincreased risk of transient paralysis with intravenous use, prostatic hypertrophy (in adults), pyloroduodenal obstruction, severe heart failure—may cause fall in cardiac output and associated increase in heart rate, mean arterial pressure and pulmonary wedge pressure

Side effects

Rare/very rare : Agitation (more common at high doses), angle closure glaucoma depression

Pregnancy

Manufacturer advises avoid; however, there is no evidence of teratogenicity. The use of sedating antihistamines in the latter part of the third trimester may cause adverse effects in neonates such as irritability, and tremor.

Breast feeding

No information available. Most antihistamines are present in breast milk in varying amounts; although not known to be harmful, most manufacturers advise avoiding their use in mothers who are breast-feeding

Adult Dose

50 mg up to 3 times a day

Pediatric dose

Child 1 month–5 years: 0.5–1 mg/kg up to 3 times a day (max. per dose 25 mg)
Child 6–11 years: 25 mg up to 3 times a day
Refer BNF for Children

Cyclizine

Mechanism of Action

Domperidone is a dopamine D_2 receptor antagonist that primarily acts in the chemoreceptor trigger zone (CTZ) and gastrointestinal (GI) tract. In the brain it Blocks D_2 receptors in the CTZ (outside the blood-brain barrier), preventing nausea and vomiting. In the GI tract, it Inhibits D_2 receptors, increasing acetylcholine release, which enhances gastric motility and emptying without increasing acid secretion.

Indications

- Nausea and vomiting (due to various causes).
- Gastroparesis.
- Reflux esophagitis.
- Functional dyspepsia.

Contraindications

- Prolonged QT interval or known cardiac arrhythmias.
- Severe hepatic impairment.

Cautions

- Patients with cardiovascular disease (risk of QT prolongation and arrhythmia).
- Renal impairment (dose adjustment required).
- Elderly (increased risk of cardiac side effects).

Side effects

- QT prolongation, ventricular arrhythmias (rare but serious).
- Dry mouth.
- Headache, dizziness.
- Galactorrhea, gynecomastia (due to prolactin elevation).
- Abdominal cramps, diarrhea.

Pregnancy

Not enough human studies; use only if benefits outweigh risks.

Breast feeding

- Excreted in breast milk in small amounts.
- Generally considered safe, but monitor for potential adverse effects in infants.

Adult Dose

- **Nausea & vomiting:** 10 mg orally 3 times daily (max 30 mg/day).
- **Gastroparesis & dyspepsia:** 10–20 mg orally 3 times daily before meals.

Pediatric dose

- **Children <12 years or weight <35 kg:** 0.25–0.5 mg/kg orally 3 times daily (max 30 mg/day).
- **Children >12 years or weight >35 kg:** Use adult dosage.

Levomepromazine

Mechanism of Action

Although the exact mechanism of action of levomepromazine is not fully known, upon administration, this agent appears to act as an antagonist for a variety of receptors in the central nervous system (CNS), including adrenergic, dopamine, histamine, cholinergic and serotonin (5-hydroxytryptamine; 5-HT) receptors.

Indications

- Pain in palliative care (reserved for distressed patients with severe pain unresponsive to other measures)
- Restlessness and confusion in palliative care
- Nausea and vomiting in palliative care
- Schizophrenia (bed patients)
- Schizophrenia

Contraindications

- Central nervous system depression
- Comatose states
- Phaeochromocytoma

Cautions

Patients receiving large initial doses should remain supine

Side effects

Common/very common : Asthenia, heat stroke
Rare/very rare Cardiac arrest, hepatic disorders

Adult Dose

Oral : Adult: 6 mg, as required
Refer BNF

Pediatric dose

Continuous subcutaneous infusion :

- Child 1–11 years: 0.35–3 mg/kg, to be administered over 24 hours
- Child 12–17 years: 12.5–200 mg, to be administered over 24 hours

Refer BNF for children

Metoclopramide hydrochloride

Mechanism of Action

The antiemetic action of metoclopramide is due to its antagonist activity at D2 receptors in the chemoreceptor trigger zone in the central nervous system. This action prevents nausea and vomiting.

Indications

- Symptomatic treatment of nausea and vomiting including that associated with acute migraine
- Delayed (but not acute) chemotherapy & Radiotherapy-induced nausea and vomiting
- Prevention of postoperative nausea and vomiting
- Hiccup in palliative care
- Nausea and vomiting in palliative care
- Acute migraine

Contraindications

- 3–4 days after gastrointestinal surgery
- Gastro-intestinal haemorrhageobstruction & perforation
- Phaeochromocytoma

Cautions

Asthma, atopic allergy, bradycardia, cardiac conduction disturbances, children, elderly, epilepsy, may mask underlying disorders such as cerebral irritation, Parkinson's disease, uncorrected electrolyte imbalance, young adults (15–19 years old)

Side effects

Common/very common : Asthenia, depression, diarrhoea
. drowsiness, hypotension, menstrual cycle irregularities .
movement disorders, parkinsonism
Rare/very rare : Confusion, galactorrhoea, seizure

Pregnancy

Not known to be harmful.

Breast feeding

Small amount present in milk; avoid.

Adult Dose

Oral : 500 micrograms/kg to 10mg up to 3 times a day

Ondansetron

Mechanism of Action

Ondansetron is a specific 5HT3-receptor antagonist which blocks 5HT3 receptors in the gastrointestinal
tract and in the central nervous system.

Indications

- Moderately emetogenic chemotherapy or radiotherapy
- Severely emetogenic chemotherapy (consult product literature for dose of concomitant corticosteroid)
- Prevention & treatment of postoperative nausea and vomiting

Contraindications

- Congenital long QT syndrome

Cautions

- Adenotonsillar surgery
- Subacute intestinal obstruction
- Susceptibility to qt-interval prolongation (Including electrolyte disturbances)

Side effects

Common/very common : Constipation, Feeling hot, headache, sensation abnormal

Rare/very rare: Dizziness, QT interval prolongation, vision disorders

Pregnancy

No information available; avoid unless potential benefit outweighs risk.

Breast feeding

Present in milk in animal studies—avoid

Adult Dose

Oral : Initially 8 mg

Doses may vary according to clinical condition, Refer BNF

Prochlorperazine

Mechanism of Action

prochlorperazine mainly blocks D2 dopamine receptors in the brain. It can also block histaminergic, cholinergic and noradrenergic receptors.

Indications

- Schizophrenia and other psychoses
- Mania
- Short-term adjunctive management of severe anxiety
- Prevention and treatment of nausea and vomiting
- Labyrinthine disorders
- Nausea and vomiting in previously diagnosed migraine

Contraindications

- Avoid oral route in child under 10 kg
- children (in psychotic disorders)
- Central nervous system depression
- omatose states
- phaeochromocytoma

Cautions

- Elderly
- Hypotension
- Hypothyroidism (in adults)

Side effects

Rare/very rare : Glucose tolerance impaired, hyperglycaemia, hyponatraemia, SIADH

Adult Dose

Initially 20 mg
Refer BNF

Pediatric dose

Different doses according to clinical condition and age.
Refer BNF for children

8 Antihyperglycemics

Gliclazide

Mechanism of Action

Gliclazide, a sulfonylurea binds to the β cell sulfonyl urea receptor (SUR1). This binding subsequently blocks the ATP sensitive potassium channels & results in closure of the channels and leads to a resulting decrease in potassium efflux leads to depolarization of the β cells. This opens voltage-dependent calcium channels in the β cell resulting in calmodulin activation, which in turn leads to exocytosis of insulin containing secretory granules.

Indications

Type 2 diabetes mellitus

Contraindications

- Avoid where possible in Acute porphyrias

Side effects

Anaemia, angioedema, dyspepsia, gastrointestinal disorder, hypersensitivity, vasculitis, hyponatraemia, severe cutaneous adverse reactions (SCARs), skin reactions

Pregnancy

The use of sulfonylureas in pregnancy should generally be avoided because of the risk of neonatal hypoglycaemia.

Breast feeding

Avoid—theoretical possibility of hypoglycaemia in the infant

Adult Dose

Oral : Initially 5 mg daily, adjusted according to response, dose to be taken with or immediately after breakfast; maximum 15 mg per day

Metformin hydrochloride

Mechanism of Action

Metformin decreases hepatic glucose production, decreases intestinal absorption of glucose, and improves insulin sensitivity by increasing peripheral glucose uptake and utilization.

Indications

- Type 2 diabetes mellitus [monotherapy or in combination with other antidiabetic drugs (including insulin)]
- Type 2 diabetes mellitus [reduction in risk or delay of onset]
- Polycystic ovary syndrome

Contraindications

- Acute metabolic acidosis (including lactic acidosis and diabetic ketoacidosis)

Cautions

Risk factors for lactic acidosis

Side effects

Common/very common : Abdominal pain, appetite decreased, diarrhoea (usually transient), gastrointestinal disorder, nausea, taste altered, vomiting

Rare/very rare : Hepatitis, lactic acidosis (discontinue), skin reactions, vitamin B12 absorption decreased

Pregnancy

Can be used in pregnancy for both preexisting and gestational diabetes. Women with gestational
diabetes should discontinue treatment after giving birth

Breast feeding

May be used during breast-feeding in women with pre-existing diabetes.

Adult Dose

Oral : Initially 500 mg once daily,

Pediatric dose

Oral : Child 10–17 years (specialist use only): Initially 500 mg once daily

9 Antihypertensives

Amlodipine

Mechanism of Action

Amlodipine is an angioselective calcium channel blocker and inhibits the movement of calcium ions into vascular smooth muscle cells and cardiac muscle cells which inhibits the contraction of cardiac muscle and vascular smooth muscle cells

Indications

- Prophylaxis of angina
- Hypertension

Contraindications

- Cardiogenic shock
- Significant aortic stenosis
- Unstable angina

Side effects

Common/very common : Asthenia, constipation, diarrhoea, drowsiness, dyspnoea, gastrointestinal discomfort, gastrointestinal disorders, joint disorders .muscle complaints, oedema, vision disorders

Rare/ very rare : Angioedema, confusion, Hepatic disorders, hyperglycaemia, hypersensitivity, leucopenia .muscle tone increased, myocardial infarction, pancreatitis, peripheral neuropathy, photosensitivity reaction .Stevens-Johnson syndrome, thrombocytopenia, vasculitis

Pregnancy

No information available - manufacturer advises avoid, but risk to fetus should be balanced against risk of uncontrolled maternal hypertension.

Breast feeding

Manufacturer advises avoid—no information available.

Adult Dose

Oral : Initially 5 mg once daily; maximum 10 mg per day

Atenolol

Mechanism of Action

It’s a Cardioselective beta-1-adrenergic antagonist, works by selectively binding to the beta-1 adrenergic receptors found in vascular smooth muscle and the heart, blocking the positive inotropic and chronotropic actions of endogenous catecholamines, thereby inhibiting sympathetic stimulation. This activity results in a reduction in heart rate, blood pressure, and decreases myocardial contractility.

Indications

- Hypertension
- Angina
- Arrhythmias
- Migraine prophylaxis
- Early intervention within 12 hours of myocardial infarction

Side effects

Common/very common : Gastrointestinal disorder

Rare/ very rare : Alopecia . dry mouth . hepatic disorders, mood altered, postural hypotension, psychosis, skin Reactions, thrombocytopenia

Breast feeding

Water soluble beta-blockers such as atenolol are present in breast milk in greater amounts than other beta blockers.

Adult Dose

Oral : 25-100 mg, depends on the clinical condition (Refer BNF)

Bisoprolol fumarate

Mechanism of Action

Bisoprolol is a synthetic beta1-selective beta-adrenergic receptor blocker with a low affinity for beta2-receptors in bronchial smooth muscle, blood vessels, and fat cells and no intrinsic sympathomimetic activity. Therefore Bisoprolol exerts cardio-selective effects include lower heart rate, decreased cardiac output, and inhibition of renin release by kidneys. At higher doses it will lose beta1 selectivity.

Indications

- Hypertension
- Angina
- Adjunct in heart failure

Contraindications

- Acute or decompensated heart failure requiring intravenous inotropes
- Sino–atrial block

Cautions

- Ensure heart failure not worsening before increasing dose

Side effects

Common / very common : Constipation
Rare or very rare : Allergic rhinitis, alopecia, Auditory disorder, conjunctivitis, flushing, hypersensitivity, Pruritus, Muscle cramps, muscle weakness, postural hypotension

Adult Dose

Oral : In Hypertension & Angina

- 5-10 mg once daily
- maximum 20 mg per day

Adjunct in heart failure

- Initially 1.25 mg once daily for 1 week
- maximum 10 mg per day

(Refer BNF)

Candesartan cilexetil

Mechanism of Action

Candesartan selectively blocks the binding of angiotensin II to AT1 in many tissues including vascular smooth muscle and the adrenal glands. This inhibits the AT1-mediated vasoconstrictive and aldosterone-secreting effects of angiotensin II and results in an overall decrease in blood pressure.

Indications

- Hypertension
- Hypertension with intravascular volume depletion
- Heart failure with impaired left ventricular systolic function when ACE inhibitors are not tolerated, Heart failure with impaired left ventricular systolic function in conjunction with an ACE inhibitor (under expert supervision)

Contraindications

- Cholestasis

Side effects

Common/ very common : Increased risk of infection

Rare/very rare : Agranulocytosis, hepatitis, hyponatraemia, leucopenia, neutropenia

Adult Dose

Oral : Initially 4 mg once daily, increased if necessary up to 32 mg daily

Diltiazem hydrochloride

Mechanism of Action

Diltiazem is a calcium channel blocker whose mechanism of action is the prevention of forward movement of calcium ions through slow channels in myocardial and vascular smooth muscle cells. It is a negative inotrope and it reduces vascular resistance.

Indications

- Prophylaxis and treatment of angina
- Chronic anal fissure
- Angina

Contraindications

- Acute porphyrias
- Left ventricular failure with pulmonary congestion
- Second- or third degree AV block (unless pacemaker fitted)
- Severe bradycardia
- Sick sinus syndrome

Cautions

With systemic use Bradycardia (avoid if severe), first degree AV block, heart failure, prolonged PR interval, significantly impaired left ventricular function

Side effects

Common/ very common : Cardiac conduction disorders, constipation, gastrointestinal discomfort, malaise, Skin reactions
Rare/very rare : Dry mouth

Pregnancy

With systemic use Avoid.

Breast feeding

With systemic use Significant amount present in milk—no evidence of harm but avoid unless no safer alternative

Adult Dose

Starts from 60 mg; maximum 360 mg per day
Refer BNF

Doxazosin

Mechanism of Action

Doxazosin selectively inhibits the postsynaptic alpha-1 receptors on vascular smooth muscle by nonselectively blocking the alpha-1a, alpha-1b, and alpha-1d subtypes12,13. This action on blood vessels decreases systemic peripheral vascular resistance, reducing blood pressure

Indications

Hypertension
Benign prostatic hyperplasia

Contraindications

- History of micturition syncope (in patients with benign prostatic hypertrophy)
- History of postural hypotension
- Monotherapy in patients with overflow bladder or anuria

Cautions

cataract surgery (risk of intra-operative floppy iris syndrome), Elderly, heart failure, pulmonary oedema due to aortic or mitral stenosis

Side effects

Common/ very common : Arrhythmias, asthenia, Chest pain, cough, cystitis, dizziness, drowsiness, dry mouth, dyspnoea, gastrointestinal discomfort, headache, hypotension, increased risk of infection, influenza like illness, muscle complaints, nausea, oedema, pain, palpitations, skin reactions, urinary disorders, vertigo

Rare/ very rare : Alopecia, bronchospasm, flushing, gynaecomastia, hepatic disorders, leucopenia, malaise, muscle weakness, thrombocytopenia, vision blurred

Pregnancy

No evidence of teratogenicity; manufacturers advise use only when potential benefit outweighs risk.

Breast feeding

Accumulates in milk in animal studies - manufacturer advises avoid.

Adult Dose

For Hypertension

Oral : Initially 1 mg once daily, maximum 16 mg per day

Lisinopril

Mechanism of Action

Lisinopril inhibits angiotensin-converting enzyme (ACE). ACE is a peptidyl dipeptidase that catalyzes the conversion of angiotensin I to the vasoconstrictor substance, angiotensin II. Angiotensin II also stimulates aldosterone secretion by the adrenal cortex. By these actions, Lisinopril acts as a vasodilator and reduces blood pressure

Indications

- Hypertension
- Benign prostatic hyperplasia

Side effects

Common/very common : Postural disorders
Rare/very rare : Anaemia, autoimmune disorder Azotaemia, bone marrow depression, gynaecomastia , hepatic disorders, hypersensitivity, hypoglycaemia, lymphadenopathy, olfactory nerve disorder, SIADH, sinusitis, toxic epidermal necrolysis

Breast feeding

Not recommended; alternative treatment options, with better established safety information during breast-feeding, are available.

Adult Dose

Starts from 2.5–5 mg once daily; maximum 80 mg per day

Losartan potassium

Mechanism of Action

Losartan is a nonpeptide angiotensin II receptor antagonist with high affinity and selectivity for the AT 1 receptor. Losartan blocks the vasoconstrictor and aldosterone-secreting effects of angiotensin II by inhibiting the binding of angiotensin II to the AT 1 receptor.

Indications

- Diabetic nephropathy in type 2 diabetes mellitus
- Chronic heart failure when ACE inhibitors are unsuitable or contra-indicated
- Hypertension (including reduction of stroke risk in hypertension with left ventricular hypertrophy)
- Hypertension with intravascular volume depletion

Cautions

- Severe heart failure

Side effects

Common/ very common : Anaemia, Hypoglycaemia, postural disorders

Rare or very : rare Atrial fibrillation, hepatitis, Hypersensitivity, paraesthesia, stroke, syncope, vasculitis

Adult Dose

Starts from 12.5 mg – 50 mg once daily, Refer BNF

Nifedipine

Mechanism of Action

Nifedipine blocks voltage gated L-type calcium channels in vascular smooth muscle and myocardial cells. This blockage prevents the entry of calcium ions into cells during depolarization, reducing peripheral arterial vascular resistance and dilating coronary arteries. These actions reduce blood pressure and alleviating angina.

Indications

- Raynaud's syndrome
- Angina prophylaxis (not recommended)
- Postponement of premature labour
- Hiccup in palliative care
- Chronic anal fissure
- Angina prophylaxis
- Hypertension

Contraindications

Acute attacks of angina, cardiogenic shock, significant aortic stenosis, unstable angina, within 1 month of myocardial infarction

Cautions

With systemic use Diabetes mellitus, elderly, heart failure, poor cardiac reserve, severe hypotension, short-acting formulations are not recommended for angina or longterm management of hypertension; their use may be associated with large variations in blood pressure and reflex tachycardia, significantly impaired left ventricular function (heart failure deterioration observed), Withdraw if ischaemic pain occurs or existing pain worsens shortly after initiating treatment

Side effects

Common/ very common : Constipation, malaise, oedema .vasodilation

Rare/ very rare : Sensation abnormal

Pregnancy

With systemic use May inhibit labour; manufacturer advises avoid before week 20, but risk to fetus should be balanced against risk of uncontrolled maternal hypertension. Use only if other treatment options are not indicated or have failed.

Breast feeding

With systemic use Amount too small to be harmful but manufacturers advise avoid

Adult Dose

Stats from 5mg orally, doses vary according to clinical condition.
Refer BNF

Ramipril

Mechanism of Action

Ramipril inhibits angiotensin-converting enzyme (ACE). ACE is a peptidyl dipeptidase that catalyzes the conversion of angiotensin I to the vasoconstrictor substance, angiotensin II. Angiotensin II also stimulates aldosterone secretion by the adrenal cortex. By these actions, Ramipril acts as a vasodilator and reduces blood pressure.

Indications

- Hypertension
- Symptomatic heart failure
- Prophylaxis after myocardial infarction in patients with clinical evidence of heart failure
- Prevention of cardiovascular events in patients with atherosclerotic cardiovascular disease or with diabetes mellitus and at least one additional risk factor for cardiovascular disease
- Nephropathy (consult product literature)

Side effects

Common/very common : Gastrointestinal disorders, increased risk of infection, muscle spasms

Rare/very rare : Conjunctivitis, hearing impairment, hepatic disorders, hypoperfusion, movement disorders, onycholysis, oral disorders .

Breast feeding

Not recommended; alternative treatment options, with better established safety information during breast-feeding, are available.

Adult Dose

Oral : Starts from 1.25–2.5 mg once daily

10 Antivirals

Acyclovir / Aciclovir

Mechanism of Action

Acyclovir is converted to its triphosphate form, acyclovir triphosphate (ACV-TP), which competitively inhibits viral DNA polymerase, incorporates into and terminates the growing viral DNA chain, and inactivates the viral DNA polymerase.

Indications

- Treatment of Varicella zoster (chickenpox)
- Treatment Herpes zoster(shingles)

Cautions

- Elderly (risk of neurological reactions), maintain adequate hydration (especially with infusion or high doses)

Side effects

Common/very common : With intravenous use Nausea, photosensitivity reaction, skin reactions With oral use Abdominal pain, diarrhoea, dizziness, fatigue, fever, headache, nausea, photosensitivity reaction, skin reactions

Rare/very rare : With intravenous use Abdominal pain, agitation, angioedema, ataxia, coma, confusion, diarrhea, dizziness, drowsiness, dysarthria, dyspnea, encephalopathy, fatigue, fever, hallucination, headache, hepatic disorders, inflammation localised, psychosis, renal impairment, renal pain, seizure, tremor
With oral use Agitation, anaemia, angioedema, ataxia, coma, confusion, drowsiness, dysarthria,

Pregnancy

Not known to be harmful—manufacturers advise use only when potential benefit outweighs risk.

Breast feeding

Significant amount in milk after systemic administration—not known to be harmful but manufacturer advises caution.

Adult Dose

Oral : 800 mg 5 times a day

Pediatric dose

Oral : starts from 100mg, Refer BNF for Children

Oseltamivir

Mechanism of Action

Oseltamivir inhibits the neuraminidase enzyme, which is expressed on the viral surface. The enzyme promotes release of virus from infected cells and facilitates viral movement within the respiratory tract.

Indications

- Prevention of influenza
- Treatment of influenza
- Treatment of influenza, in the immunocompromised

Side effects

Common/very common : dizziness, gastrointestinal discomfort, herpes simplex, nausea, sleep disorders, vertigo, vomiting

Rare/very rare : angioedema, anxiety, behaviour abnormal, confusion, delirium, delusions, haemorrhage, hallucination, hepatic disorders, self-injurious behaviour, severe cutaneous adverse reactions (scars), thrombocytopenia, visual impairment

Pregnancy

Although safety data are limited, oseltamivir can be used in women who are pregnant when the potential benefit outweighs the risk (e.g. during a pandemic).

Breast feeding

Although safety data are limited, oseltamivir can be used in women who are breast-feeding when the potential benefit outweighs the risk (e.g. during a pandemic). Oseltamivir is the preferred drug in women who are breast-feeding.

Adult Dose

Oral : 75 mg twice daily

Pediatric dose

Oral : Starts fom 3 mg/kg, different doses according to age and body weight.
Refer BNF for children

Zanamivir

Mechanism of Action

Action of Zanamivir is via inhibition of influenza virus neuraminidase with the possibility of alteration of virus particle aggregation and release. By binding and inhibiting the neuraminidase protein, the drug renders the influenza virus unable to escape its host cell and infect others.

Indications

- Post-exposure prophylaxis of influenza
- Prevention of influenza during an epidemic
- Treatment of influenza

Cautions

- Asthma . chronic pulmonary disease .
- uncontrolled chronic illness

Side effects

Common/very common : Skin reactions
Rare/very rare : Face oedema, Bronchospasm, dehydration, dyspnea, oropharyngeal oedema, presyncope, severe cutaneous adverse reactions (SCARs), throat tightness

Pregnancy

Although safety data are limited, zanamivir can be used in women who are pregnant when the potential benefit outweighs the risk (e.g. during a pandemic). Use only if potential benefit outweighs risk (e.g. during a pandemic).

Breast feeding

Although safety data are limited, zanamivir can be used in women who are breast-feeding when the potential benefit outweighs the risk (e.g. during a pandemic). Amount probably too small to be harmful; use only if potential benefit outweighs risk (e.g. during a pandemic).

Adult Dose

Inhalation powder : 10 mg once daily

Pediatric dose

Inhalation powder : 10 mg once daily

11 Bronchodilators

Ipratropium bromide

Mechanism of Action

Ipratropium bromide is an anticholinergic (parasympatholytic) agent, which blocks the muscarinic receptors of acetylcholine.

Indications

- Reversible airways obstruction
- obstructive pulmonary disease
- Acute bronchospasm
- Severe or life-threatening acute asthma

Cautions

Avoid spraying near eyes
Cystic fibrosis

Side effects

Common/very common : Gastrointestinal motility disorder, throat complaints
Rare : Corneal oedema, diarrhea, eye disorders, eye pain, respiratory disorders, vomiting

Pregnancy

Manufacturer advises only use if potential benefit outweighs the risk.

Breast feeding

No information available - manufacturer advises only use if potential benefit outweighs risk.

Adult Dose

different doses according to the clinical condition. Refer BNF

Pediatric dose

Different doses according to the clinical condition. Refer BNF for children

Salbutamol

Mechanism of Action

It is a short-acting β2 adrenergic receptor agonist which works by causing relaxation of airway smooth muscle.

Indications

- Asthma
- Other conditions associated with reversible airways obstruction
- Prophylaxis of allergen- or exercise-induced bronchospasm
- Acute & chronic asthma
- Exacerbation of reversible airways obstruction (including nocturnal asthma)
- Prophylaxis of allergen- or exerciseinduced Bronchospasm
- Uncomplicated premature labour (between 22 and 37 weeks of gestation) (specialist supervision in hospital)
- Acute bronchospasm

Contraindications

When used for uncomplicated premature labour under specialist supervision : Abruptio placenta, antepartum haemorrhage, cord compression, eclampsia, history of cardiac disease, intra-uterine fetal death, intra-uterine infection, placenta praevia, pulmonary hypertension, severe pre-eclampsia, significant risk factors for myocardial ischaemia, threatened miscarriage

Cautions

- High doses of beta2 agonists can be dangerous in some children
- With intravenous use mild to moderate pre-eclampsia (when used for uncomplicated premature labour), suspected cardiovascular disease

Side effects

Common/very common : Muscle cramps
Rare/very rare : Akathisia, vasodilation

Breast feeding

Inhaled drugs for asthma can be taken as normal during breast-feeding.

Adult Dose

Different doses according to clinical condition and route of admission. Refer BNF

Pediatric dose

Different doses according to clinical condition and route of admission. Refer BNF for children

Theophylline

Mechanism of Action

Theophylline relaxes the smooth muscle of the bronchial airways and pulmonary blood vessels and reduces airway responsiveness to histamine, and allergen. Theophylline competitively inhibits type III and type IV phosphodiesterase (PDE), the enzyme responsible for breaking down cyclic AMP in smooth muscle cells, possibly resulting in bronchodilation. Theophylline also binds to the adenosine A2B receptor and blocks adenosine mediated bronchoconstriction.

Indications

- Reversible airways obstruction
- Severe acute asthma
- Chronic asthma

Cautions

Cardiac arrhythmias or other cardiac disease, elderly (increased plasma-theophylline concentration), epilepsy, fever, hypertension, hyperthyroidism, peptic ulcer, risk of hypokalaemia

Side effects

Anxiety, arrhythmias, diarrhoea, dizziness, gastrointestinal discomfort, gastrooesophageal reflux disease, headache, hyperuricaemia, nausea, palpitations, seizure, skin reactions, sleep disorders, tremor, urinary disorders, vomiting

Overdose

Theophylline in overdose can cause vomiting (which may be severe and intractable), agitation, restlessness, dilated pupils, sinus tachycardia, and hyperglycaemia.

Pregnancy

Neonatal irritability and apnoea have been reported. Theophylline can be taken as normal during pregnancy as it is particularly important that asthma should be well controlled during pregnancy.

Breast feeding

Present in milk—irritability in infant reported; modified-release preparations preferable. Theophylline can be taken as normal during breastfeeding.

Adult Dose

Starts from 175mg, different doses according to the clinical condition. Refer BNF

Pediatric dose

Starts from 175mg, different doses according to the clinical condition. Refer BNF for children

Tiotropium

Mechanism of Action

Tiotropium bromide is a long-acting muscarinic antagonist (LAMA). Tiotropium is an antagonist of muscarinic receptors M1 to M5. Inhibition of the M3 receptor in the smooth muscle of the lungs leads to relaxation of smooth muscle and bronchodilation.

Indications

- Maintenance treatment of chronic obstructive pulmonary disease
- Severe asthma (add-on to inhaled corticosteroid)

Cautions

Arrhythmia, heart failure, myocardial infarction in the previous 6 months

Side effects

Rare/very rare : Bronchospasm, dysphagia, epistaxis, insomnia, oral disorders

Pregnancy

Manufacturer advises avoid—limited data available.

Breast feeding

Manufacturer advises avoid—no information available.

Adult Dose

Inhalation of powder : 1 capsule once daily

12 Diuretics

Amiloride hydrochloride

Mechanism of Action

Amiloride hydrochloride is a new, orally administered, potassium-sparing diuretic with mild natriuretic and diuretic properties. Its primary site of action is the distal tubule of the nephron where it selectively blocks sodium transport, thereby inhibiting sodium-potassium exchange.

Indications

- Oedema (monotherapy)
- Potassium conservation when used as an adjunct to thiazide or loop diuretics for hypertension, congestive heart failure & hepatic cirrhosis with ascites

Contraindications

- Addison's disease
- Anuria
- Hyperkalaemia

Cautions

- Diabetes mellitus
- Elderly

Side effects

Alopecia, angina pectoris, aplastic anaemia, appetite decreased, arrhythmia, arthralgia, asthenia, atrioventricular block exacerbated, bladder spasm, chest pain, confusion, constipation, cough, depression, diarrhoea, dizziness, drowsiness, dry mouth, dyspnea, dysuria, electrolyte imbalance, encephalopathy, gastrointestinal discomfort, gastrointestinal disordersgastrointestinal haemorrhage, gout, headache, insomnia, jaundice, muscle cramps, nasal congestion, nausea, nervousness, neutropenia, pain, palpitations, paraesthesia, postural hypotension, sexual dysfunction, skin reactions, tinnitus, tremor, vertigo, visual impairment, vomiting

Pregnancy

Not to be used to treat gestational hypertension.

Breast feeding

Manufacturer advises avoid - no information available.

Adult Dose

Oral : Initially 5-10 mg daily, maximum 20 mg per day

Bendroflumethiazide

Mechanism of Action

Bendroflumethiazide is a thiazide diuretic which works by inhibiting Na+/Cl- reabsorption at the beginning of the distal convoluted tubule (DCT) in the kidneys. Water is lost as a result of more sodium reaching the collecting ducts.

Indications

- Oedema
- Hypertension

Side effects

Blood disorder, cholestasis, erectile dysfunction, gastrointestinal disorder, gout, hyperglycaemia, neutropenia, pneumonitis, pulmonary oedema, rash, severe cutaneous adverse reactions (SCARs)

Breast feeding

The amount present in milk is too small to be harmful. Large doses may suppress lactation.

Adult Dose

Oral : Starts with 2.5 mg daily

Bumetanide

Mechanism of Action

Bumetanide interferes with renal cAMP and/or inhibits the sodium-potassium ATPase pump. Bumetanide appears to block the active reabsorption of chloride and possibly sodium in the ascending loop of Henle, altering electrolyte transfer in the proximal tubule. This results in excretion of sodium, chloride, and water and, hence, diuresis.

Indications

Oedema

Side effects

Common/very common : Dehydration, hypotension, skin reactions

Rare/very rare : Hearing impairment

Pregnancy

Bumetanide should not be used to treat gestational hypertension because of the maternal hypovolaemia associated with this condition.

Breast feeding

No information available. May inhibit lactation.

Adult Dose

Oral : Starts from 1 mg per dose.

Furosemide

Mechanism of Action

Furosemide, like other loop diuretics, acts by inhibiting the luminal Na-K-Cl cotransporter in the thick ascending limb of the loop of Henle, by binding to the chloride transport channel, thus causing sodium, chloride, and potassium loss in urine.

Indications

- Oedema & Resistant oedema
- Resistant hypertension

Cautions

Hepatorenal syndrome, hypoproteinaemia may reduce diuretic effect and increase risk of side-effects

Side effects

- Agranulocytosis, aplastic anaemia, auditory disorder, eosinophilia, fever, gout, haemolytic anaemia, hepatic encephalopathy, mucosal reaction, nephritis tubulointerstitial, , shock, skin eruption, tetany, vasculitis

- With oral use Acute kidney injury, hepatic disorders, metabolic acidosis, psychiatric disorder, urinary disorders
- With parenteral use Acute urinary retention, cholestasis

Pregnancy

Furosemide should not be used to treat gestational hypertension because of the maternal hypovolaemia associated with this condition.

Breast feeding

Amount too small to be harmful. May inhibit lactation

Adult Dose

Oral : Starts from Initially 40 mg daily

Spironolactone

Mechanism of Action

Spironolactone competitively inhibits aldosterone dependant sodium potassium exchange channels in the distal convoluted tubule. This action leads to increased sodium and water excretion, but more potassium retention. The increased excretion of water leads to diuretic and also antihypertensive effects.

Indications

- Oedema & Ascites in cirrhosis of the liver
- Malignant ascites
- Nephrotic syndrome
- Oedema in congestive heart failure
- Moderate to severe heart failure (adjunct)
- Resistant hypertension (adjunct)
- Primary hyperaldosteronism in patients awaiting surgery

Contraindications

- Addison's disease
- Anuria
- Hyperkalaemia

Cautions

- Acute porphyrias
- Elderly
- Potential metabolic products carcinogenic in rodents

Side effects

Acidosis hyperchloraemic, acute kidney Injury, agranulocytosis, alopecia, breast neoplasm benign, breast pain, confusion, dizziness, electrolyte imbalance, gastrointestinal disorder, gynaecomastia, hepatic function abnormal hyperkalaemia (discontinue), hypertrichosis, leg cramps, leucopenia, libido disorder, malaise, menstrual disorder, nausea, severe cutaneous adverse reactions (SCARs), skin reactions, thrombocytopenia

Pregnancy

Use only if potential benefit outweighs risk—feminisation of male fetus in animal studies.

Breast feeding

Metabolites present in milk, but amount too small to be harmful.

Adult Dose

Oral : For Ascites - Dose starts from 100 mg daily
For Heart failure, Hypertension - Initially 25 mg once daily

13 Intravenous Fluids

Geloplasma / Gelatin

Indications

Low blood volume in hypovolaemic shock, burns and cardiopulmonary bypass

Cautions

- Cardiac disease
- Severe liver disease

Side effects

Rare/very rare : Chills, dyspnoea, fever, hyperhidrosis, hypersensitivity, hypertension, hypotension, hypoxia, tachycardia, tremor, urticaria, wheezing

Pregnancy

Advises avoid at the end of pregnancy.

Adult Dose

Intravenous infusion : Initially 500–1000 mL, use 3.5–4% solution

Glucose

Mechanism of Action

Glucose also known as dextrose is a simple sugar (monosaccharide) that is used to increase the level of blood sugar (glucose) when the level falls too low (hypoglycemia). Glucose in this form increases the level of the blood sugar, so it is a glucose-elevating agent

Indications

- Establish presence of gestational diabetes
- Oral glucose tolerance test
- Hypoglycaemia
- Energy source
- Water replacement
- Persistent cyanosis
- Management of diabetic ketoacidosis

Cautions

Do not give alone except when there is no significant loss of electrolytes
prolonged administration of glucose solutions without electrolytes can lead to hyponatraemia and other electrolyte disturbances

Side effects

Chills, electrolyte imbalance, fever, fluid imbalance, hypersensitivity, local reaction, localised pain, polyuria, rash, venous thrombosis

Adult Dose

For Hypoglycemia -
Intravenous infusion : 10 g, to be administered as Glucose 20% intravenous infusion

Pediatric dose

For Hypoglycemia -
Intravenous infusion : 500 mg/kg, to be administered as Glucose 10% intravenous infusion

Hartmann's solution / Ringer's lactate solution / sodium lactate solution

Mechanism of Action

Absorption As Compound Sodium Lactate (Hartmann's) is directly administered to the systemic circulation, the bioavailability (absorption) of the active components is complete (100%). Excretion Excess of calcium is predominantly excreted by the renal system, as in the case of potassium and sodium excretion.

Indications

For prophylaxis, and replacement therapy, requiring the use of sodium chloride and lactate, with minimal amounts of calcium and potassium

Adult Dose

Intravenous infusion : Consult product literature

Normal Saline / Sodium chloride

Mechanism of Action

Normal saline is a crystalloid fluid. Normal saline contains electrolytes (sodium and chloride ions) which dissociates in solution

Indications

- Prophylaxis of sodium chloride deficiency
- Chronic renal salt wasting
- Management of diabetic ketoacidosis (to restore circulating volume if systolic blood pressure is below 90mmHg and adjusted for age, sex, and medication as appropriate)

Cautions

- With intravenous use Avoid excessive administration, cardiac failure, dilutional hyponatraemia especially in the elderly, hypertension, peripheral oedema, pulmonary oedema, restrict intake in impaired renal function, toxaemia of pregnancy

Side effects

With intravenous use Chills, fever, hypervolaemia, hypotension, local reaction, localised pain, paraesthesia, skin reactions, tremor, vascular irritation, venous thrombosis

With oral use Abdominal cramps, acidosis hyperchloraemic, diarrhoea, generalised oedema, hypertension, hypotension, irritability, muscle complaints, nausea, vomiting

Adult Dose

Oral : Initially 4–8 tablets daily, to be taken with water, up to maximum 20 tablets

14 Laxatives

Bisacodyl

Mechanism of Action

Bisacodyl works by stimulating enteric nerves to cause peristalsis, mainly on colon. It is also a contact laxative, increases fluid and salt secretion.

Indications

Constipation
Bowel clearance before radiological procedures and surgery

Contraindications

- Acute abdominal conditions (in children)
- acute inflammatory bowel disease
- Acute surgical abdominal conditions
- Intestinal obstruction
- severe dehydration

Cautions

- Excessive use of stimulant laxatives can cause diarrhoea and related effects such as hypokalaemia, risk of electrolyte imbalance with prolonged use (in children)

Side effects

Common/very common : Gastrointestinal discomfort, nausea

Rare/very rare : Angioedema, Colitis, dehydration

Pregnancy

May be suitable for constipation in pregnancy, if a stimulant effect is necessary

Adult Dose

Oral : Initially 5–10 mg once daily

Pediatric dose

Oral : Initially 5–20 mg once daily

Glycerin/ Glycerol

Mechanism of Action

Glycerin suppositories produce laxative action by causing rectal distention, thereby stimulating the urge to defecate; by causing local rectal irritation; and by triggering a hyperosmolar mechanism that draws water into the colon.

Indications

- Constipation

Contraindications

- Intestinal obstruction
- Undiagnosed abdominal pain

Adult Dose

By rectum : 4g

Pediatric dose

By rectum : 1-4g as required

Lactulose

Mechanism of Action

Lactulose is a synthetic sugar. It breaks down in your large intestine and then draws water into the intestine. This softens your stool, which helps ease constipation.

Lactulose also appears to inhibit intestinal ammonia production several mechanisms. Colonic metabolism of lactulose to lactic acid results in acidification of the gut lumen. This favors conversion of ammonium (NH4) to ammonia (NH3) and the passage of ammonia from tissues into the lumen, thus reduces blood ammonia concentrations.

Indications

- Constipation
- Hepatic encephalopathy (portal systemic encephalopathy)

Contraindications

- Galactosaemia
- Intestinal obstruction

Cautions

- Lactose intolerance

Side effects

Common/very common : Abdominal pain, Diarrhoea, flatulence, nausea, vomiting
Rare : Electrolyte imbalance

Pregnancy

Not known to be harmful.

Adult Dose

Oral : Initially 15 mL twice daily,

Pediatric dose

Starts with 2.5 mL twice daily
Different doses according to age, refer BNF for children

Macrogol /Polyethylene Glycol (PEG)

Mechanism of Action

Macrogol is an osmotically acting laxative, that is an inert substance that passes through the gut without being absorbed into the body. It relieves constipation because it causes water to be retained in the bowel instead of being absorbed into the body.

Indications

- Chronic constipation
- Faecal impaction
- Bowel cleansing before colonoscopy

Contraindications

- Intestinal obstruction & perforation
- Paralytic ileus
- Severe inflammatory conditions of the intestinal tract (including crohn's disease
- Ulcerative colitis and toxic megacolon)
- Use of 'paediatric' sachets for faecal impaction in impaired cardiovascular function (no information available) (in children)

Cautions

- Cardiovascular impairment (should not take more than 2 ’full-strength’ sachets or 4 ’half-strength’ sachets in any one hour)
- Impaired consciousness (with high doses)
- Impaired gag reflex (with high doses)
- Reflux oesophagitis (with high doses)

Side effects

Electrolyte imbalance (discontinue if symptoms occur), flatulence, gastrointestinal discomfort, nausea, vomiting

Pregnancy

Manufacturers advise may be used - limited data available.

Adult Dose

Initially 1 sachet/small packet. Numbers of sachets vay according to clinical condition. Refer BNF

Pediatric dose

Initially 1 sachet/small packet. Different numbers of sachets according to clinical condition. Refer BNF for children

Senna

Mechanism of Action

Senna contains sennosides which acts as a stimulant laxative. It works by irritating and stimulating intestinal cells, producing contractions in intestines, water influx to the intestines and bowel movement.

Indications

Constipation

Contraindications

- Intestinal obstruction
- undiagnosed abdominal pain

Side effects

Albuminuria, Diarrhoea, electrolyte Imbalance, fluid imbalance, gastrointestinal discomfort, haematuria, pseudomelanosis coli, skin reactions, urine Discolouration

Pregnancy

Specialist sources indicate suitable for use in pregnancy.

Breast feeding

Specialist sources indicate suitable for use in breast-feeding in infants over 1 month.

Adult Dose

Oral : 7.5–15 mg daily
maximum dose is 30 mg daily

Pediatric dose

Oral : 7.5–30 mg once daily

Sodium acid phosphate with sodium phosphate

Mechanism of Action

Rectal sodium phosphate is a laxative from the saline laxatives class. Its mechanism of action is not well-known, but it is believed that the laxative action may result from phosphate ions that are not well absorbed within the small intestine, causing a retention of water and indirectly increasing bowel movements.

Indications

Constipation

Contraindications

- With oral use : Acute severe colitis, ascites, congestive cardiac failure, gastric retention, gastro-intestinal obstruction, gastro-intestinal perforation, toxic megacolon
- With rectal use conditions associated with increased colonic absorption, gastro-intestinal obstruction, inflammatory bowel disease

Cautions

- With oral use cardiac disease (avoid in congestive cardiac failure), colitis (avoid if acute severe colitis), elderly and debilitated patients, fluid and electrolyte disturbances, hypovolaemia (should be corrected before administration), impaired gag reflex or possibility of regurgitation or aspiration
- With rectal use Ascites, congestive heart failure, elderly and debilitated patients, electrolyte disturbances, uncontrolled hypertension

Side effects

Common/very common : Chills, gastrointestinal discomfort, nausea, vomiting, chest pain, dizziness, headache

Rare/ very rare Electrolyte imbalance, metabolic acidosis, Allergic dermatitis, arrhythmia, hypotension, loss of consciousness, muscle cramps, myocardial infarction, nephrocalcinosis, paraesthesia, renal impairment, tetany

Pregnancy

With oral use Caution.

Breast feeding

With oral use Caution.

Adult Dose

By rectum : 128mL once daily

Pediatric dose

By rectum : 45– 128mL once daily

Docusate sodium

Mechanism of Action

Docusate lowers the surface tension at the oil-water interface of the feces, allowing water and lipids to penetrate the stool. This helps to hydrate and soften the fecal material, facilitating natural defecation.

Indications

- Chronic constipation
- Adjunct in abdominal radiological procedures

Contraindications

- Avoid in intestinal obstruction

Cautions

- Do not give with liquid paraffin, excessive use of stimulant laxatives can cause diarrhoea and related effects such as hypokalaemia, rectal preparations not indicated if haemorrhoids or anal fissure

Side effects

Rare/very rare : With oral use Abdominal cramps, nausea, rash

Pregnancy

Not known to be harmful—manufacturer advises caution.

Breast feeding

Manufacturer advises caution—present in milk following oral administration.
Rectal administration not known to be harmful.

Adult Dose

Oral : Up to 500 mg daily in divided doses

Pediatric dose

Oral : Starts from 12.5 mg up to 500 mg daily in divided doses

15

Proton Pump Inhibitors & Drugs Used In Acid Peptic Disease

Esomeprazole

Mechanism of Action

Esomeprazole is a proton pump inhibitor that suppresses gastric acid secretion by specific inhibition of the H+/K+- ATPase in the gastric parietal cell.

Indications

- NSAID-associated gastric ulcer
- Prophylaxis of NSAID-associated gastric ulcer in patients with an increased risk of gastroduodenal complications who require continued NSAID treatment
- Prophylaxis of NSAID-associated gastric or duodenal ulcer
- Gastro-oesophageal reflux disease Zollinger–Ellison syndrome
- Severe peptic ulcer bleeding (following endoscopic treatment)
- Helicobacter pylori eradication in combination with clarithromycin and amoxicillin or metronidazole

Side effects

Rare/very rare : Aggression, agitation, bronchospasm, Encephalopathy, increased risk of infection, muscle weakness, vitamin B12 deficiency

Pregnancy

Manufacturer advises caution - no information available.

Breast feeding

Manufacturer advises caution - no information available.

Adult Dose

Oral : 20 mg once daily

Pediatric dose

Oral : 10-20 mg once daily

Lansoprazole

Mechanism of Action

Its mechanism of action is to selectively inhibit the membrane enzyme H+/K+ ATPase in gastric parietal cells.

Indications

- Helicobacter pylori eradication in combination with amoxicillin and clarithromycin; or in combination with amoxicillin and etronidazole; or in combination with clarithromycin and metronidazole
- Benign gastric & Duodenal ulcer
- NSAID-associated duodenal & gastric ulcer
- Prophylaxis of NSAID-associated gastric & duodenal ulcer
- Zollinger–Ellison syndrome (and hypersecretory conditions)
- Gastro-oesophageal reflux disease
- Severe oesophagitis
- Severe oesophagitis, refractory to initial treatment
- Acid-related dyspepsia

Side effects

Common/very common : Dry throat, fatigue
Uncommon Eosinophilia, oedema
Rare/very rare : Anaemia, angioedema, appetite Decreased, erectile dysfunction, fever, glossitis, oesophageal candidiasis, pancreatitis, restlessness, tremor

Pregnancy

Manufacturer advises avoid.

Breast feeding

Avoid -present in milk in animal studies

Adult Dose

Oral : 30 mg twice daily

Omeprazole

Mechanism of Action

Omeprazole is a selective and irreversible proton pump inhibitor. It suppresses stomach acid secretion by specific inhibition of the H+/K+-ATPase system found at the secretory surface of gastric parietal cells.

Indications

- Helicobacter pylori eradication in combination with amoxicillin and clarithromycin; or in combination with amoxicillin and metronidazole; or in combination with
- Clarithromycin and metronidazole
- Benign gastric ulceration or duodenal ulceration
- Prevention of relapse in gastric or duodenal ulcer
- Prophylaxis in patients with a history of NSAID-associated gastric/duodenal ulcer who require continued NSAID treatment
- NSAID-associated gastroduodenal ulcer or erosions

- Zollinger–Ellison syndrome
- Gastro-oesophageal reflux disease
- Acid reflux disease (long-term management)
- Acid-related dyspepsia
- Treatment and prevention of benign gastric ulcers, duodenal ulcers, NSAID-associated ulcers & gastro-oesophageal reflux disease
- Major peptic ulcer bleeding (following endoscopic treatment)

Side effects

Rare/very rare : Aggression, agitation, bronchospasm, encephalopathy, gastrointestinal candidiasis, muscle weakness

Pregnancy

Not known to be harmful.

Breast feeding

Present in milk but not known to be harmful

Adult Dose

10–20 mg once daily

Ranitidine

Mechanism of Action

Ranitidine is a competitive, reversible inhibitor of the action of histamine at the histamine H2 receptors found in gastric parietal cells. This results in decreased gastric acid secretion and gastric volume, and reduced hydrogen ion concentration.

Indications

- Benign gastric & duodenal ulceration
- Chronic episodic dyspepsia
- NSAID-associated gastric ulceration & duodenal ulcer
- Gastro-oesophageal reflux disease
- Gastric acid reduction (prophylaxis of acid aspiration) in obstetrics
- Gastric acid reduction (prophylaxis of acid aspiration) in surgical procedures
- Prophylaxis of stress ulceration
- Reflux oesophagitis and other conditions where gastric acid reduction is beneficial
- Conditions where reduction of gastric acidity is beneficial and oral route not available

Side effects

Rare/very rare Bone marrow depression, bradycardia, breast conditions, dyskinesia, nephritis acute interstitial, acute pancreatitis, vision blurred

Pregnancy

Manufacturer advises avoid unless essential, but not known to be harmful.

Breast feeding

Significant amount present in milk, but not known to be harmful.

Adult Dose

Oral : 150-600 mg twice daily

Pediatric dose

Oral : Starts from 1 mg/kg 3 times a day

16 Sedatives

Chlordiazepoxide hydrochloride

Mechanism of Action

Chlordiazepoxide binds to stereospecific benzodiazepine (BZD) binding sites on GABA-A receptor complexes at several sites within the central nervous system, including the limbic system and reticular formation. This results in an increased binding of the inhibitory neurotransmitter GABA to the GABA-A receptor. The net neuro-inhibitory effects result in the observed sedative, hypnotic, anxiolytic, and muscle relaxant properties.

Indications

- Short-term use in anxiety
- Treatment of alcohol withdrawal in dependence

Contraindications

- Chronic psychosis, hyperkinesis, not for use alone to treat depression (or anxiety associated with depression), obsessional states, phobic states, respiratory depression

Cautions

- Muscle weakness, organic brain changes

Side effects

Common/very common : Movement disorders
Rare/very rare : Abdominal distress, agranulocytosis, bone marrow disorders, erectile dysfunction, leucopenia, menstrual disorder, skin eruption, thrombocytopenia

Breast feeding

Benzodiazepines are present in milk, and should be avoided if possible during breast-feeding.

Adult Dose

Oral : Initially 10 mg 3 times a day

Diazepam

Mechanism of Action

Diazepam is a Benzodiazepine, It binds to specific receptors in the central nervous system. They thus cause an increased inhibitory effect of the neurotransmitter gamma-aminobutyric acid (GABA).

Indications

- Muscle spasm & Tetanus
- Anxiety, Insomnia associated with anxiety
- Acute panic attacks, anxiety and agitation
- Acute alcohol withdrawal
- Acute drug-induced dystonic reactions
- Acute Premedication
- Sedation
- Status epilepticus, Febrile convulsions, Convulsions due to poisoning
- Life-threatening acute drug-induced dystonic reactions
- Dyspnoea associated with anxiety in palliative care
- Pain of muscle spasm in palliative care

Contraindications

- Avoid injections containing benzyl alcohol in neonates
- Chronic psychosis (in adults)
- CNS depression
- Compromised airway
- Hyperkinesis
- Not for use alone to treat depression (or anxiety associated with depression) (in adults)
- Obsessional states
- Phobic states .
- Respiratory depression

Cautions

- Muscle weakness
- Organic brain changes
- Specific cautions
- High risk of venous thrombophlebitis with intravenous use (reduced by using an emulsion formulation)

Side effects

Common/very common : Appetite abnormal, concentration impaired, movement disorders, Muscle spasms, palpitations, sensory disorder, vomiting

Rare/very rare : Bradycardia, bronchial secretion increased, cardiac arrest, dry mouth, gynaecomastia, heart failure, Constipation, diarrhea, hypersalivation, Skin reactions, speech slurred, leucopenia, loss of consciousness, memory loss, respiratory arrest, sexual dysfunction, Syncope

Pregnancy

Women who have seizures in the second half of pregnancy should be assessed for eclampsia before any change is made to antiepileptic treatment.

Status epilepticus should be treated according to the standard protocol.

Breast feeding

Present in milk, and should be avoided if possible during breast-feeding.

Adult Dose

Different doses according to different clinical conditions.
Refer BNF

Pediatric dose

Different doses according to different clinical conditions & age.
Refer BNF for children

Haloperidol

Mechanism of Action

The active mechanism of Haloperidol is to block postsynaptic dopamine (D2) receptors in the mesolimbic system of the brain.

Indications

- Prophylaxis of postoperative nausea and vomiting [in patients at moderate to high risk and when alternatives ineffective or not tolerated]
- Combination treatment of postoperative nausea and vomiting [when alternatives ineffective or not tolerated]
- Nausea and vomiting in palliative care
- Schizophrenia and schizoaffective disorder
- Acute delirium [when non-pharmacological treatments ineffective]
- Moderate to severe manic episodes associated with bipolar disorder
- Acute psychomotor agitation associated with psychotic disorder or manic episodes of bipolar disorder

- Rapid control of severe acute psychomotor agitation associated with psychotic disorder or manic episodes of bipolar disorderPersistent aggression and psychotic symptoms in moderate to severe Alzheimer's dementia and vascular dementia Severe tic disorders, including Tourette's syndrome [when educational, psychological and other pharmacological treatments ineffective]
- Mild to moderate chorea in Huntington's disease [when alternatives ineffective or not tolerated]
- Restlessness and confusion in palliative care

Contraindications

Central nervous system depression, comatose states, congenital long QT syndrome, dementia with Lewy bodies, history of torsade de pointes, history of ventricular arrhythmia, Parkinson's disease, progressive supranuclear palsy, QTc-interval prolongation, recent acute myocardial infarction, uncompensated heart failure, uncorrected hypokalaemia

Cautions

Bradycardia, electrolyte disturbances (correct before treatment initiation), family history of Qtcinterval prolongation, history of heavy alcohol exposure, hyperthyroidism, hypotension (including orthostatic hypotension), prolactin-dependent tumours, prolactinaemia, risk factors for stroke

Side effects

Common/very common : Depression, eye disorders, headache, hypersalivation, nausea, Neuromuscular dysfunction, psychotic disorder, vision disorders, weight decreased

Rare/very rare Hypoglycaemia, respiratory disorders, SIADH, trismus, Breast abnormalities, confusion, dyspnoea, gait abnormal, hepatic disorders, hyperhidrosis, menstrual cycle irregularities, muscle complaints, musculoskeletal stiffness, oedema, Photosensitivity reaction, restlessness, sexual dysfunction, skin reactions, temperature regulation disorders

Pregnancy

Manufacturer advises it is preferable to avoid—moderate amount of data indicate no malformative or fetal/neonatal toxicity, however there are isolated case reports of birth defects following fetal exposure, mostly in combination with other drugs; reproductive toxicity shown in animal studies

Adult Dose

Intramuscular injection : Starts from 1–2 mg. Different doses according to different clinical conditions, Refer BNF

Lorazepam

Mechanism of Action

Lorazepam is a benzodiazepine with anxiolytic, anti-anxiety, anticonvulsant, anti-emetic and sedative properties. Lorazepam enhances the effect of the inhibitory neurotransmitter gamma-aminobutyric acid on the GABA receptors by binding to a site that is distinct from the GABA binding site in the central nervous system.

Indications

- Short-term use in anxiety
- Short-term use in insomnia associated with anxiety
- Acute panic attacks
- Conscious sedation for procedures
- Status epilepticus, Febrile convulsions, Convulsions caused by poisoning

Cautions

- Muscle weakness
- organic brain changes
- parenteral administration

Side effects

Common/very common : Apnoea, asthenia, coma, disinhibition, extrapyramidal symptoms, hypothermia, memory loss, speech slurred, suicide attempt

Rare/very rare : Agranulocytosis, hyponatraemia, pancytopenia, SIADH, thrombocytopenia

Breast feeding

Benzodiazepines are present in milk, and should be avoided if possible during breast-feeding.

Adult Dose

Oral : 1–4 mg daily in divided doses

Refer BNF

Pediatric dose

Slow intravenous injection :

- Child 1 month–11 years: 100 micrograms/kg (max. per dose 4 mg)
- Child 12–17 years: 4 mg for 1 dose

Refer BNF for children

Midazolam

Mechanism of Action

The actions of benzodiazepines such as midazolam are mediated through the inhibitory neurotransmitter gamma-aminobutyric acid (GABA), which is one of the major inhibitory neurotransmitters in the central nervous system. Benzodiazepines bind to the benzodiazepine site on GABA-A receptors, which potentiates the effects of GABA. Benzodiazepines increase the activity of GABA, thereby producing a sedating effect, relaxing skeletal muscles, and inducing sleep, anesthesia, and amnesia.

Indications

- Status epilepticus
- Febrile convulsions
- Conscious sedation for procedures
- Sedative in combined anaesthesia
- Premedication

- Induction of anaesthesia (but rarely used)
- Sedation of patient receiving intensive care
- Adjunct to antipsychotic for confusion and restlessness in palliative care
- Convulsions in palliative care

Contraindications

- Central nervous system depression
- Compromised airway
- severe respiratory depression

Cautions

Cardiac disease, children (particularly if cardiovascular impairment), concentration of midazolam in children under 15 kg not to xceed 1 mg/mL, debilitated patients (reduce dose)(in children), hypothermia, hypovolaemia (risk of severe hypotension), neonates, risk of airways obstruction and hypoventilation in children under 6 months (monitor respiratory rate and oxygen saturation), vasoconstriction

Side effects

Common/very common : Level of consciousness decreased, vomiting

Rare/very rare : Apnoea, bradycardia, cardiac arrest, constipation, dry mouth, dyspnoea, hiccups, movement disorders, physical assault, respiratory disorders vasodilation

Breast feeding

Small amount present in milk—avoid breast-feeding for 24 hours after administration (although amount probably too small to be harmful after single doses).

Adult Dose

Buccal administration : 10 mg

Phenobarbital (Phenobarbitone)

Mechanism of Action

Phenobarbital works by increasing the amount of time chloride channels are open which in turn depresses the central nervous system. This is done by acting on GABA-A receptor subunits

Indications

- All forms of epilepsy except typical absence seizures
- Status epilepticus

Cautions

Avoid in Acute porphyrias, children, Debilitated, elderly, history of alcohol abuse, history of drug abuse, respiratory depression (avoid if severe)

Side effects

Agranulocytosis, anticonvulsant hypersensitivity syndrome, behaviour abnormal, bone disorders, bone fracture, cognitive impairment, confusion, depression, drowsiness, folate deficiency, hepatic disorders, memory loss, movement disorders

Pregnancy

Monitoring The dose should be monitored carefully during
pregnancy and after birth, and adjustments made on a
clinical basis.

Breast feeding

Avoid if possible; drowsiness may occur.

Adult Dose

Intravenous injection : 10 mg/kg (maximum per dose 1 g)

Zopiclone

Mechanism of Action

Zopiclone exerts its action by binding on the benzodiazepine receptor complex and modulation of the GABA-B receptor chloride channel macromolecular complex and causes an enhancement of the inhibitory actions of GABA to produce hypnotic and anxiolytic effects

Indications

Insomnia

Cautions

Avoid prolonged use (risk of tolerance and withdrawal symptoms), chronic pulmonary insufficiency (increased risk of respiratory depression), elderly, history of drug abuse, muscle weakness, myasthenia gravis (avoid if unstable), psychiatric illness

Side effects

Common/very common : Dry mouth, taste bitter
Rare/ very rare : Behaviour abnormal, confusion, dyspnoea, fall, hallucination, irritability

Pregnancy

Not recommended (risk of neonatal withdrawal symptoms). Use during late pregnancy or labour may cause neonatal hypothermia, hypotonia, and respiratory depression.

Breast feeding

Present in milk—avoid.

Adult Dose

Mouth : Initially 3.75 mg

17 Statins

Atorvastatin

Mechanism of Action

Atorvastatin is a statin medication and a competitive inhibitor of the enzyme HMG-CoA (3-hydroxy-3-methylglutaryl coenzyme A) reductase, which catalyzes the conversion of HMG-CoA to mevalonate, an early rate-limiting step in cholesterol biosynthesis. Atorvastatin acts primarily in the liver, where decreased hepatic cholesterol concentrations stimulate the upregulation of hepatic low-density lipoprotein (LDL) receptors, which increases hepatic uptake of LDL and lowers plasma cholesterol levels.

Indications

- Primary hypercholesterolaemia
- Combined (mixed) hyperlipidaemia
- Homozygous & Heterozygous familial hypercholesterolaemia
- Primary & Secondary prevention of cardiovascular events in patients at high risk of a first cardiovascular event

Cautions

Haemorrhagic stroke

Side effects

Common/very common : Epistaxis, hyperglycaemia, hypersensitivity, joint disorders, laryngeal pain, muscle complaints, nasopharyngitis, pain

Rare/very rare : Angioedema, gynaecomastia, hearing loss, severe cutaneous adverse reactions (SCARs)

Breast feeding

Manufacturer advises avoid—no information available.

Adult Dose

Oral : Usual dose 10 mg once daily; increased if necessary up to 80 mg once daily

Simvastatin

Mechanism of Action

Simvastatin is a statin medication and a competitive inhibitor of the enzyme HMG-CoA (3-hydroxy-3-methylglutaryl coenzyme A) reductase, which catalyzes the conversion of HMG-CoA to mevalonate, an early rate-limiting step in cholesterol biosynthesis. Simvastatin acts primarily in the liver, where decreased hepatic cholesterol concentrations stimulate the upregulation of hepatic low-density lipoprotein (LDL) receptors, which increases hepatic uptake of LDL and lowers plasma cholesterol levels.

Indications

- Primary hypercholesterolaemia
- Combined (mixed) hyperlipidaemia
- Homozygous familial hypercholesterolaemia
- Prevention of cardiovascular events in patients with atherosclerotic cardiovascular disease or diabetes mellitus

Side effects

Rare/very rare : Acute kidney injury, anaemia, muscle cramps

Breast feeding

Manufacturer advises avoid—no information available.

Adult Dose

Oral : 10–20 mg once daily, then increased if necessary up to 80 mg once daily

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